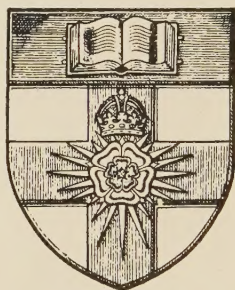
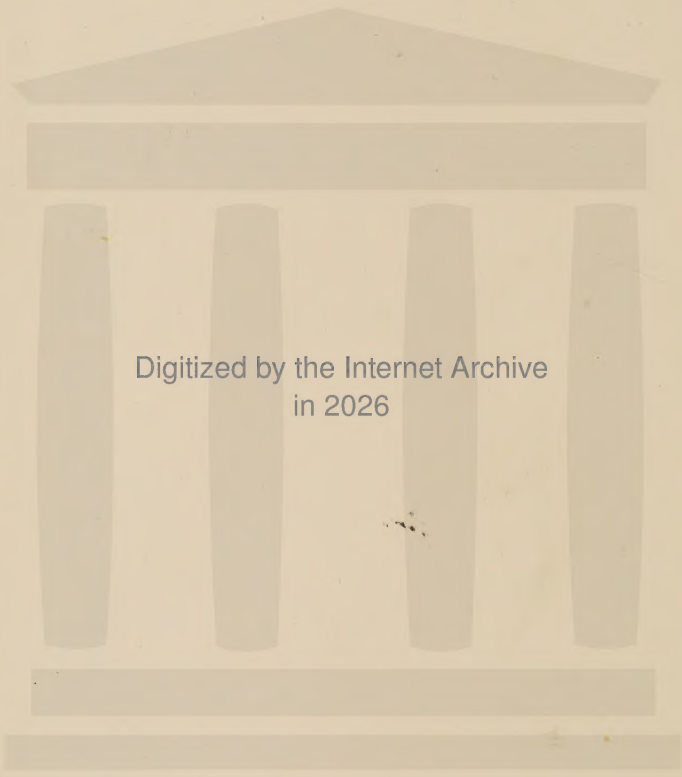


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THE INSTITUTION OF SURVEYORS.

TRANSACTIONS.

VOL. VI.

SESSION 1873-74.

LONDON:

PUBLISHED AT THE ROOMS OF THE INSTITUTION,
12, GREAT GEORGE STREET, WESTMINSTER, S.W.

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NOTE.



THIS Institution does not, as a body, hold itself responsible for statements made or opinions expressed, either in the Papers read or in the discussions which have occurred, at the Meetings.

The Institution of Surveyors,

12, GREAT GEORGE STREET, WESTMINSTER, S.W.

OFFICERS, 1873-74.

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Honorary Secretary.

JOHN WORNHAM PENFOLD

THIS COUNCIL WILL CONTINUE UNTIL MAY 1874.

The Institution of Surveyors

Is established—

1. To secure the advancement and facilitate the acquisition of that knowledge which constitutes the profession of a Surveyor, viz.—the art of determining the value of all descriptions of landed and house property, and of the various interests therein; the practice of managing and developing estates; and the science of ad-measuring and delineating the physical features of the earth.
2. To promote the general interests of the profession, and to maintain and extend its usefulness for the public advantage.

THE INSTITUTION consists of three classes, viz.—MEMBERS, ASSOCIATES, and HONORARY MEMBERS, with a class of STUDENTS attached.

A MEMBER must be more than twenty-five years of age, and have acquired a practical knowledge of surveying in one or other of its branches as above defined, and so practised on his own account for more than five years; or be a member of a firm of surveyors established upwards of ten years; or in partnership with a surveyor of ten years' standing. Every Member is eligible for election on the Council, for election or appointment to all offices of the Institution, and entitled to all its rights and privileges.

An ASSOCIATE must be more than twenty-one years of age, not necessarily a surveyor by profession, but his pursuits must be such as to qualify him to concur with surveyors in the advancement of professional knowledge. Associates are not eligible for the offices of President or Vice-President, but are eligible for election on the Council or for election or appointment to other offices of the Institution; they have

access to the Library, subject to the regulations of the Council, and are entitled to vote and take part in the affairs of the Institution at all Annual, Ordinary, and Special General Meetings of Members and Associates.

AN HONORARY MEMBER must be a person who, either by reason of his position or his eminence in science and experience, may be enabled to render assistance in promoting the objects of the Institution, but who is not engaged in practice as a surveyor in Great Britain or Ireland. He has the privilege of being present and taking part at all Ordinary General Meetings, and of access to the Library, but no right of voting, discussing, or otherwise interfering in the affairs of the Institution; nor is he called on to contribute to its funds.

STUDENTS, not under eighteen years of age, may be admitted by the Council on the recommendation (according to a form) of four Members and two Associates, or of the Member or Associate to whom they are or have been articled, and they may remain Students of the Institution at and during the pleasure of the Council, until they attain the age of twenty-one years, when they shall cease to be Students.

The Council may accord to Students such privileges, subject to such terms, regulations, and restrictions, as they shall from time to time prescribe.

Any person desirous of being admitted into the Institution (excepting to the class of Students) must be proposed and recommended according to a form, in which the full name, place of business (if any), usual residence, and qualifications of the candidate must be distinctly specified. This form must be subscribed by him, and signed by at least six Members or four Members and two Associates, certifying a personal knowledge of the candidate.

The proposal so made, being delivered to the Secretary, will be submitted to the Council, who, on approving the qualifications, will determine the class for which the candidate is to be presented for ballot at an Ordinary General Meeting of Members and Associates.

The following are the rates of contribution to the funds :—

	Annual Subscription.				Admission Fee.		
	£	s.	d.		£	s.	d.
<i>Student</i> . . .	1	1	0	.	—		
<i>Associate</i> . . .	2	2	0	.	3	3	0
<i>Member</i> . . .	3	3	0	.	5	5	0

An Associate may compound for his annual subscription for twenty guineas, and a Member for thirty guineas.

With the view of forming a Library and Collection, all Members and Associates are expected, within twelve months after their election, to deliver to the Council an original Paper on some subject connected with the profession, or to make a donation to the Library or Collection.

The affairs of the Institution are under the management of a Council which is elected annually, consisting of a President, four Vice-Presidents, twelve Members, and two Associates. Besides the above, the Past Presidents, and the President or Chairman of any local Association in alliance with this Institution, are Members of the Council *ex-officio*.

The Session of the Institution commences annually on the second Monday in November, and continues to the end of May. The Ordinary General Meetings are held on every alternate Monday during the Session. At these Meetings original communications are read on some professional subject, and their merits fully and freely discussed. Every Member and Associate has the privilege of introducing one visitor to these Meetings. Members and Associates are entitled to a copy of any printed publication issued by the Institution after their admission.

THE OPENING ADDRESS,
BY
EDWARD NORTON CLIFTON, PRESIDENT,
AT THE ORDINARY GENERAL MEETING OF
THE INSTITUTION OF SURVEYORS,
NOVEMBER 10TH, 1873.

GENTLEMEN,

It has been considered desirable to open the present session with something less formal than the usual presidential address, as the occasion marks a sort of era in our existence as an Institution, and, as such, has been thought worthy of some special commemoration. With that object in view, the Council have invited you to meet them, at the *Conversazione* to be held here on Wednesday evening, and encourage them by your presence in believing that the changes—and they are great—which have been effected in the premises of the Institution since we last met, are such as have secured your approval. As our Meeting to-night is, mainly, of a formal character, and since I have already explained (in the opening address which I delivered at the commencement of my term of office) my views of the aims and objects which should animate us as a body united together for purposes of mutual advantage, it is unnecessary to detain you long on the present occasion.

Nevertheless, I cannot forbear,—considering the special circumstances of this Meeting,—availing myself of the opportunity of referring to a few points which call strongly for notice.

Let me, as a first duty, thank you for your kindness in re-electing me to the office of President of this flourishing Society. I feel it a peculiar honour, and no small pleasure, to address you this evening in the handsome hall in which we have now met together for the first time.

We could possess no better proof of the inherent vitality of our Society than is furnished by the fact that, in the few years since its foundation, we have been able—and without imprudence—to provide ourselves with such a professional home. It is not saying too much when I aver my belief, that few Societies in London are better housed, and that not more than two or three can boast of premises possessing, in an equal degree with our own, so many combined conveniences as regards locality, accommodation, and architectural completeness. It may happen, from time to time, owing to variations in the degree of interest excited by particular Papers or Discussions, that our architectural clothing may seem to fit us a little loosely; but, it will be remembered, that wise and prescient parents are not particular about nicety of fit in the garments of growing children, and, in the same way, we have sought to show our confidence in the Society's capacity for increase, by making provision for that increase. Moreover, it was felt by the Council that what we did should be done thoroughly, and once for all, and I believe you will agree with us that we have exercised a wise discretion in so shaping our endeavours.

It is unnecessary for me to direct your attention, in detail, to the various changes which have been effected—you can see them for yourselves. Our new library will enable us to give every convenience to country Members, while on casual or periodical visits to town, for the transaction of business; and consultation rooms have been provided, which are always gratuitously at the service of Members. So, too, in deciding upon the character of the hall in which we are to-night assembled, the Council have had in view the desirability of providing a room which should not only afford the fullest accommodation, together with good light and ventilation (a want so much felt in our old room) for our fortnightly Meetings, but which should also possess the requisites of a good arbitration room, available, at moderate charges, for those of our Members and their friends who prefer the quiet and comfort of such a room, specially fitted and designed as it is for the purpose, to the noisy, ill-adapted, and ill-ventilated places in which so many of us pass a great portion of our existences.

And how, it will be asked, has so young a Society contrived to possess itself of the advantages, to which I have referred, at such a comparatively early stage of its existence? Well, the answer is very simple. The secret has been the confidence which our Members have shown in its intrinsic stability, by responding, with more than sufficient readiness, to the appeal of the Council to provide the funds requisite for the carrying out of the undertaking; nor would there, we found, have been any difficulty in raising, among ourselves, a much larger sum than was actually needed or than we have taken power to raise. It is with some pride I announce to you that, so far from any excess over our estimate having accrued, our expenditure on the building

will, we believe, fall short of the amount anticipated. I am not just now in a position to give you the actual figures, as the accounts will not be made up till the end of the year; but I believe that they will, when published, fully bear out my assertion.

As a great deal of our expenditure has been met out of actual accumulated funds, our debt is not a very heavy one; but, still, I feel that its speedy extinction is most desirable, as our usefulness, in certain directions in which we would wish, when able, to exercise it, is somewhat impeded so long as any debt exists.

We trust that the growth of our Society, by swelling our resources, may enable us to extinguish a portion of our capital debt each year; and we appeal to you, individually, to help us in our efforts in so doing, by seeking to induce those of our professional brethren whose connection with the Society would be a mutual advantage, to join us.

And now, having described, with as much brevity as the subject admitted, the work actually done, I hasten to discharge a gratifying duty, and one which makes the strongest demands upon my personal acknowledgments, and, I doubt not, upon yours also.

All of us, more especially those who are architects, can see that the work which has been accomplished must have made heavy demands—in the variety of its details, and in the energy, promptitude, and completeness with which it has been done—upon the time, the patience, and the zeal of those answerable for it.

The Building Committee, consisting of MR. CHATFIELD

CLARKE, Mr. RYDE, Mr. SHOPPEE, Mr. STEPHENSON, and myself, have devoted a great deal of time and care to the various arrangements; and, setting myself aside, I feel that your gratitude is very greatly due to Mr. CLARKE, Mr. RYDE, Mr. SHOPPEE, and Mr. STEPHENSON, for the experience, skill, and taste which they have placed so heartily and earnestly at the service of the Institution in connection with the work; but I think—as I am sure my coadjutors on the Building Committee will also think—that it is no derogation from the debt of obligation accruing to ourselves to admit that to our friend Mr. PENFOLD's untiring and zealous co-operation we are, in an eminent degree, indebted for the admirable changes effected in our premises. I am sure that you will all join with me in expressing our sense of the value of his efforts, and whatever may be the gratification he may feel from these expressions of ours, it will, I feel sure, be supplemented, very largely, by the pleasure with which he sees the actual completion, to-night, of the work in which he has performed so important a part.

Since the last occasion on which I had the pleasure of addressing you, another (the fifth) volume of *Transactions* has been completed. It will, I believe, bear comparison with any of its predecessors, both as regards the practical value and the interesting nature of its contents. The carefully written and useful Papers contributed by our friends Mr. ARUNDEL ROGERS and Mr. CASTLE show how much we are likely to benefit from the aid which our legal Members are so well qualified to give us. Our profession is one which forms one of the frontiers of law-land, across which both we and our legal friends have occasionally to step, and our experiences are of a kind likely to be of reciprocal value. Several of our Associates, whose names do not yet appear in

our *Transactions*, may, I trust, be induced, before long, to contribute to the fund of useful knowledge which we are, year by year, accumulating.

It would be invidious to select any of the remaining Papers for special commendation. They are all of great value, and we trust that their authors may be induced, from time to time, to repeat their efforts.

And now, as to the future. There is plenty of fresh ground to be opened up by our literary explorers.

I may remind Members that many of the topics already indicated in previous addresses, as suitable for discussion, yet remain undealt with. Thus, such subjects as the various methods for securing the increased productiveness of the land; the erection of farm buildings; the conditions which regulate the value of that very variable article of sale called building land, and the methods, times, and circumstances under which that increment of value comes into existence and is most advantageously dealt with. Then, again, some of our quantity surveyors may contribute a very useful Paper or two upon their special branch of practice. Road making, also, is a subject which several Members of our Institution are very competent to deal with. Again, the question of woodland and plantation management is one which offers abundant scope for Papers; and we might, in this way, accumulate a literature of forestry, which is much needed.

The working of the Road Acts in our country parishes has been already suggested as a suitable topic for discussion; and the great agricultural labour question, touched on by Mr. STURGE, last session, and which has not yet found its

solution, and threatens to affect, in a very serious degree, the management of land, is one which, setting aside its political aspects, has seriously to be considered by surveyors acting as the advisers of land-owners. Another subject—rural water supply—also suggested in a previous address, still invites our attention. I could multiply, indefinitely, the list of subjects falling strictly within our province, and which may occupy our time with great advantage, but will only refer to one other before I conclude.

The present unparalleled dearness of that chief article of national wealth—coal—has given a great impetus to mining enterprise, with a view to the opening up of fresh supplies. The Coal Committee, in their admirable report, issued in 1871, point to the probability of the discovery of coal under the Permian, New Red Sandstone, and other super-incumbent strata, at depths from which there are reasonable grounds for believing that the mineral can be recovered with profit. Thus it may happen that the geographical distribution of coal recovery may, at no very distant day, be much extended,—a result which must give, whenever it occurs, an enormous increase to the value of the overlying land. Under these circumstances, it behoves our younger Members to acquaint themselves with the special information now confined almost exclusively to surveyors practising in the so-called mineral districts,—a kind of knowledge which will, gradually, become less narrowly localized than at present. Perhaps those of our Members who are connected with this particular branch of practice, will be induced to contribute a few practical Papers, bearing on this important subject, to some future volume of our *Transactions*.

Gentlemen, I have already exceeded the limits within

which I proposed to confine my address. In conclusion, I appeal to you to aid the Council in their endeavour to extend the usefulness and enhance the importance of our Society ; and to co-operate with us in the work which has this evening reached one stage of its accomplishment.

A vote of thanks to the PRESIDENT, for his address, was proposed by Mr. W. J. BEADEL, seconded by Mr. V. BUCKLAND, and carried unanimously.

The Meeting then adjourned.

AGRICULTURAL GEOLOGY.

By E. P. SQUAREY, MEMBER.

*Read at the Ordinary General Meeting of the INSTITUTION OF SURVEYORS,
November 24th, 1873.*

THE PRESIDENT IN THE CHAIR.

THE title of this Paper will doubtless raise expectations which may, perhaps, remain unsatisfied; but I venture to think that the relations existing between the agricultural capacity of land, and its geological character, may interest, and possibly instruct, the younger Members of this Institution.

I do not intend in this Paper to trespass on your patience by any speculations on the causes of the existing varied distribution of soils, nor to recount the fossils and special characteristics by which each formation is recognised; nor shall I detail the minute sub-divisions of the more important strata which have been arrived at by the close observation and attention which, of late years, they have received. I abstain from these points, because I am not thoroughly informed upon them, and because such special knowledge (however important and interesting) would scarcely connect itself with the objects of this Institution.

I propose to myself the pleasant duty of placing before you the results of my own observation and experience of the agricultural character and products of the chief distinctive geological formations of England and Wales, modified as such character and conditions are by climate, elevation, and locality.

I will commence with the most recent formation, which the geological Ordnance maps describe as "alluvium."

Alluvium is of the most varied character, depending for its fertility, or otherwise, upon the strata from the disintegration of which it has been formed, or is now forming; thus,—The mud brought down by the Severn is now, probably, producing in the Bristol Channel a soil of the same character as the rich marsh land surrounding Bridgewater; whilst the wash from the sands and gravels of the New Forest is, comparatively speaking, as unproductive as the forest itself.

The richest alluvial soils may be looked for in the wash of the older formations. The marsh lands of the northern and southern shores of the Bristol Channel derive their fertility from the new and old red sandstone and oolites, through which the Severn, the Wye, the Usk, and the Avon flow. The Valley of the Thames near London, again, is composed of the detritus of the oolites, green-sand, chalk, and London and plastic clays, ground into a happy mixture, which, under the energy of the market gardeners of the neighbourhood, yields, probably, the largest produce of any land in the world.

The banks of the Humber, embracing, geologically, the island of Axholme and the rich lands forming the extreme eastern coast of Lincolnshire, are an alluvium of the highest fertility—from the limestones, new and old red sandstones, oolite and chalk of Yorkshire, Nottingham, and Lincolnshire. Fringes of alluvium appear all round our coast. Romney Marsh and the Essex marshes, and the rich lands round Wisbeach, Spalding, and Boston, are special instances of these conditions. I need scarcely multiply them; but it may be stated that wherever alluvium from the older formations (to which allusion has been made) is found, the soil is almost invariably of a most productive character.

Its application is, however, modified by climate, and throughout the Somerset marshes, pasture land invariably obtains; on the eastern coast, with a drier air and better

corn-ripening conditions, the larger portion is arable land. Its value ranges from 15s. to 80s. per acre.

The Tertiary is the upper formation, which, as a definite geological deposit, has received a status in all works on this subject. It is now divided into almost innumerable series, but for our purposes it may be still classed in the deposits of the pliocene, miocene, and eocene periods.

The latter comprise the Plastic and London clays, and Woolwich and Reading beds resting on the chalk, with the Lower Bagshot sands and gravels and Bracklesham beds; whilst the later pliocene series are scarcely distinguishable from the formation which I have classed as alluvium.

The Plastic and London clays, and Woolwich beds, are the formations most intimately known in this neighbourhood.

Under the good management incident to their vicinity to London, they arrive, after draining, at considerable capacity for arable and meadow purposes, and from them this great city is almost entirely supplied with hay, which, I may remark parenthetically, is better made than in any other part of England.

In those localities where the London and Woolwich Beds are developed under conditions less favourable to good farming, their reputation is of a moderate character, and their rental (for purely agricultural purposes) may be taken at from 18s. to 28s. per acre. As a rule, they contain a large quantity of the red oxide of iron, and, when drained, are considered moderately "proofy" for sheep and cattle.

Next in the geological series is the great Chalk formation. Stretching from the north-eastern coasts of Yorkshire and Lincolnshire, it runs, in a band of fluctuating width, to the southern shores of Kent, Sussex, Hampshire, and Dorset. It is divided into the upper and lower chalk, which, agriculturally, have undoubtedly a distinctive character. Speaking broadly, its chemical character may be defined as a carbonate

of lime, containing more or less phosphatic matter, with silex in the shape of flints, in stratified or nodular forms.

This great series is invariably more or less coated with the wash or natural deposit of the tertiary formation. In some cases, the plastic and London clays and gravels rest upon it, with sufficient depth, almost, to justify the exclusion of these soils from the chalk series; whilst in other cases the chalk subsoil is barely coated with a thin, sandy, weak soil of the lowest fertility. As a rule, the upper chalk is the least fertile: it abounds more in flint, and is of a more crystalline, harder nature than the lower series. Where covered with the gravelly clays of the London and Reading beds, and with the thin soils referred to above, an application of the subsoil to the extent of 60 to 70 tons per acre is most beneficial. This is usually accomplished at a cost of from £2 to £3 per acre, and in respect of it a tenant-right (which is defined at the end of this Paper) is, in the southern counties, usually conceded.

The action of the chalk in these cases is partly chemical, partly mechanical. A coherence is given by the decomposing chalk to the thinner soils; whilst, in the heavier classes of land, its action is to render easier the operation of ploughing, &c. In both cases the carbonate of lime is most useful, and the benefit extends over 20 or 30 years.

In the comparatively rare cases where the coating of soil, referred to above, is wanting, and where vegetation has to deal with the chalk itself, almost barrenness is the result. Years of exposure are required before the decomposition of the mineral has sufficiently proceeded to enable the lowest forms of vegetation to exist upon it. These cases are very exceptional, and only occur, within my knowledge, on the steepest escarpments of the chalk hills.

The lower chalk is of a soapier nature. The soils are superior, generally, to those of the upper chalk.

The Tertiary series frequently rest on the lower chalk,

and some extremely fine land is found under this union of soils. Innumerable varieties of quasi-alluvium are found in the valleys of the chalk series.

Gravels and sands from the tertiary series, clays and loams from the Purbeck and oolites, contribute each their quatum to the great fertility of these valleys, in which irrigation of the meadow land produces as early and rich a crop of grass as can be found. The down pastures range from 5s. to 14s. per acre in value, and the arable lands fluctuate from 12s. to 35s. per acre. The irrigated meadows of the chalk valleys command prices from 60s. up to 90s. per acre.

The green-sand underlies the chalk, and is divided into two formations, the upper and lower green-sand, which are widely separated in character and fertility. The upper green-sand, at its junction with the chalk, forms a marly loam of heavy cultivation, but one of the most productive soils of our country for wheat, barley, beans, and clover.

Developed to a limited extent in the south of Dorset, it is exposed in increasing areas near Devizes and Pewsey in Wilts, in the Vale of White Horse in Berks, through Oxfordshire, in the fertile Vale of Aylesbury, and in the rich arable lands of Bedfordshire and Cambridgeshire.

Surrey and Kent claim it also at isolated points, and in one favoured locality in the former county, the green-sand largely contributes to the unprecedented fertility of the "Heart" at Farnham. A mixture of chalk, green-sand, gault, London clay, and gravelly alluvium, here, produces hops of pre-eminent quality and quantity. Indeed, nowhere have I seen the growth of this beautiful plant so developed as here, and it is amply represented by rents, which reach £8 per acre.

To illustrate the geological identity of application, it may be observed that this same formation affords the best hop farms near Canterbury.

When a soil of the green sandstone is formed from its decomposition alone,—particularly where the red oxide of iron is united in large quantities with it,—there is a rapid decrease of fertility: the turnips are affected with the anbury, or “fingers and toes;” the grass land is sour, and the cereals grow less vigorously. The application of about 120 to 150 bushels of lime, or 18 or 20 tons of chalk per acre, acts magically in remedying these conditions. Carrots, mangold wurtzel, and swedes flourish on the soils.

The gault, which intervenes between the upper and lower green-sand, is a strong bluish green clay, not largely exposed. It is good for pasture, but stubborn for arable purposes, though fairly productive, and is best represented in the immediate vicinity of the chalk hills in Kent and Sussex.

The annual value of the chalk marls, at the junction of the green-sands and chalk, ranges from 33s. to 50s. per acre. The ordinary green-sand, except when applied to quasi-market garden produce, fluctuates in value from 32s. to 42s.: in the latter case it commands 50s. or 60s. per acre.

The lower green-sand assumes great variety in colour, from a brown ferruginous green to brilliant yellows and reds, which are beautifully shown in the charming, but infertile district, intersected by the London and South Western (Portsmouth Direct) Railway, and again in the escarpment of the formation near the Sandy station on the Great Northern Railway. Exceptions to the general barrenness of the lower green-sands of course arise, of which the onion and seed growing districts near Biggleswade are special instances.

The existence of coprolites in this formation is of great interest. Found in greater or less quantity on the whole series, and doubtless contributing, by their decomposition, to the fertility of the best of these soils, they are specially numerous in Cambridgeshire. On the plain of the green-sand surrounding Cambridge, upon which rest considerable beds of tertiary sands and gravels of varying fertility, these

remains are found at irregular depths, but in marvellous quantities. I venture to hope that some Member of the Institution who has leased lands for coprolite diggings, will inform the Meeting of the terms of working, and the great prices realized thereby. Mindful of my compact, I hesitate to speculate upon the origin and formation of these new mineral elements of wealth.

Next in order follows the special feature of the south-eastern portion of England. I mean "the wealden," a vast area of clay alternating with the Hastings sands, upon the origin of which the late Dr. MANTEL has written with an eloquence and charm which carries the reader from this ignorant present into the mysterious depths of the past, to dream that he witnesses the slow deposition of the formation in this mighty estuary, where the grim iguanodon and his fellows dwelt through long ages. Few of my audience but know these wealden series, in their passage through Kent and Sussex, by the South Eastern Railway to Dover and Hastings. Dismissing the refined but interesting sub-divisions into which it has lately been separated, it stands out broadly defined, as those rolling hills and valleys of clay, which stretch from the eastern boundary of Surrey through central Sussex and southern Kent.

Stubborn of temper, wet and unkind to those who know not how to manage them, these soils yet yield to their patient cultivators an average satisfactory return through the intervention of hops. The pastures are not rich or proofy. I may remark, parenthetically, that this is a country into which no man ignorant of its special management should venture as a farmer.

Its value varies from 20s. to 28s. per acre on the clay soils, and from 12s. to 20s. on the sands.

Forming part of the same series is a narrow band in Kent, and a small area in Dorset and Wilts, called the Purbeck beds, from the island of that name on the Dorsetshire

coast. It embraces clays, sands, and limestone, the latter full of remains of shells (more or less crystalline, and in the latter condition forming Purbeck marble), which afford exceptionally good hop and fruit lands; the Maidstone district is of this character. The value of the sands and clays ranges from 15s. to 25s. per acre, and the loams, where rock is developed, from 35s. to 40s. For hop and market garden purposes, from £4 to £5 per acre is paid.

We now approach one of the largest, and, possibly, the most generally fertile of the great geological series of England.

From the coast of Dorsetshire stretches, in a gradually widening band, across the great central plateau of England, to the coast of Lincoln and Yorkshire, the wonderful oolite formation. It is divided into the upper or Portland oolite, the great oolite and the lower oolite. The great or middle oolite is sub-divided into the coral rag, and the lower series so well known as producing the Bath stone. The two first, *i.e.*, the Portland and the coral rag rocks, are separated by the Kimmeridge clay (so called after a small and secluded village on the Dorset coast, where the sections from the chalk to the Kimmeridge clay are beautifully exposed, and which is well worth a visit from a geological student), and between the coral rag and the great oolite the Oxford clay appears. Beneath the Bath and the lower oolite "Fuller's earth" is occasionally, but not continuously, found.

These stone soils, and intervening clays and sands, have each a general agricultural uniformity; but, as a rule, the stone soils are chiefly applied to arable purposes. The arable lands of the upper oolites are, generally, of a stronger type than those of the great and lower oolite, which latter are more familiarly known as the "corn brash" and coral rags or forest marble. They are, generally, thin loamy lands, resting on the shelly rock, with much broken débris of the underlying rocks mixed with them, containing large quantities

of the red oxide of iron, which fit them well for stock purposes. The coral rags and lower oolite are generally preferred; but it is obvious that over a series so extensive, great alternation of admixture of clays and sands must occur, and that any description must be general rather than particular.

Some of these lands are at considerable elevation, having regard to their application to arable purposes.

The Cotswolds are a large instance of this; but as the formation trends north-east, the elevation, with rare exceptions, gradually lessens, and arable lands of the highest fertility are found near Banbury in North Oxfordshire, Buckinghamshire, and Northamptonshire.

The Kimmeridge and Oxford clays are almost invariably applied to pasture and meadow purposes. The rich dairy lands of the Vale of Blackmoor in Dorset, the dairy and grazing lands of North Wilts, intersected by the Great Western Railway from a few miles below Didcot to Bath, the fat pastures of Oxfordshire and Buckinghamshire, and the gradually richer grazing lands of Northampton and Leicestershire, confirm this statement. Doubtless there are occasional varieties and exceptions, but as a whole this great formation is very productive and valuable. The arable lands of the oolite series may be taken to range from 20s. up to 35s. per acre; the meadow and pasture lands of the Kimmeridge and Oxford clays fluctuate from 35s. to 63s.

The natural productiveness of the soils of this and the next formation is attributable, probably, to the enormous quantity of animal life existing during the oolitic and liatic periods.

The Kimmeridge clays abound with shales, producing oils, which apparently indicate an animal origin; whilst every rock of the oolite is the tomb of innumerable molluscs and corallines.

If I have ventured to place high in the catalogue of

fertility the oolite series, at least to one particular section of the succeeding strata I may accord nearly the maximum of fertility of lands other than alluvial. The decomposition of the marlstone of the upper lias formation and the underlying liatic sands are equally productive of grass of the most nutritive quality and large quantity, as well as of corn, roots, flax, and elm, oak, and most other timbers. The site of these soils of the best quality is limited. They appear near the south-western extremity of Dorset, expand near Yeovil into a considerable area, of which one point reaches the Bristol Channel, and thence trending irregularly into Gloucestershire, forming the Vale of Berkeley, they run continuously through Worcestershire, Northamptonshire, Rutland, Leicestershire, to the coast east of Lincoln up to the Humber, with one or two small developments on the Yorkshire side. It must not be understood that all these lands deserve the high position which I have accorded the marlstones and the liatic sands. Below them, and with intervening strata of considerable fertility, are clays of most unsatisfactory character for all agricultural purposes. Chiefly applied as grass land, they invariably need a maximum of drainage, and are generally much benefitted by the application of lime, which is found in association with them.

The value of the best of the marlstone and liatic sands, under favourable climatic conditions, for purely agricultural purposes, ranges from 50s. to 65s. per acre; whilst the clays, to which reference has been made, scarcely command the value of more than 15s. to 20s. per acre.

It is on the admixture of sands and clays of the upper lias that a peculiar disease develops itself in cattle. It is a rapid inflammation of the spleen in animals grazing in the late spring or early summer on the best of these pastures. It is exceptional and confined to special fields, and attacks more frequently cattle in moderate condition than those fed

during the preceding winter on cake or other nutritious food. It is invariably fatal; and the contingency (however carefully guarded against) undoubtedly affects the value of these otherwise excellent pastures. The lands on which this disease prevails in Somerset are called the "Teart lands." In one field near Ilchester, thirty beasts died of this disease in the year 1855. The concurrent feeding of oil-cake or corn is a great mitigation of this disease, but does not absolutely prevent it.

The next formation, the New Red sandstones and marls, occupies probably the largest area of any one geological series in England.

Furnishing some of the richest pastures in the south of Devon, in the neighbourhood of Crediton and Exeter, it runs in a narrowing band by Taunton to the Bristol Channel. Appearing again near Gloucester, it gradually widens through the counties of Worcestershire, Warwickshire, Staffordshire, and thence, flanked on the east by the magnesian limestone, it forms a continuous line to the coast, in the county of Durham, near Hartlepool, while to the west it embraces the chief area of Cheshire and the outlying coast of Lancashire.

These soils, in Devon and Somerset, are of exceptional excellence, and (chiefly applied as grass lands) command rentals of from 50s. to 60s. per acre. And in the Vale of Taunton, as arable land, 45s. and 50s. an acre are readily paid. In its development through Gloucestershire and Worcestershire (where, as in the former counties, it is greatly applied for fruit-growing purposes) its quality and value gradually depreciate. Clays take the place of loams, and the whole formation seems to possess less natural fertility. These remarks, as to the decreasing fertility of this formation, must be limited to a line south of Nottingham. Beyond that district my experience is too limited to justify an opinion; but I may remark that I have seen excellent

land on this formation in the neighbourhood of Selby and Knaresborough; and, again, near Carlisle, where a large area is exposed.

I must now ask you to extend to me your forbearance with respect to certain formations in England lying between the new and the old red sandstone, with which my acquaintance is insufficient to justify any remarks. I trust that some Member of this Institution, who has local knowledge hereon, will fill up this interval. My ignorance is special as to the carboniferous limestones and the coal series underlying.

The Old Red sandstone, or Devonian series as it is called, occupies the greater part of Devon and Cornwall, the counties of Monmouth, Hereford, and a large portion of Shropshire. It is also developed in Warwick, near Coventry, and again near Birmingham. The land is of most varied quality; some of the wash of the old red sandstone near Modbury and Kingsbridge on the south coast of Devon is of rare excellence for grazing purposes; indeed, we have recently dealt with a small estate in that neighbourhood, of which the rent, exclusive of tithes and rates, was 70s. per acre, for purely agricultural purposes.

Favoured portions of the counties of Monmouth, Hereford, and Shropshire have extensive areas of excellent land; but, like its kindred of the new red sandstone, it rapidly degenerates into thin weak clays and sands, which require thorough drainage and liberal treatment to make them productive.

To this series belongs the slaty schistose formation, which covers so large an area of the central parts of Devon and the north of Somerset, through which, in the former county, the granite of Dartmoor is thrust up.

The soils are, generally, of the poorest; but there are occasional conditions under which the valleys that have received the wash of these and limestone rocks, with the

admixture of some of the old red formation, are highly productive. These, however, are very limited areas.

This formation is described, commonly, as the millstone grit, and is developed very generally through Yorkshire and Durham; but I have little knowledge of its characteristics there, except in passing by railway.

I have now to address myself to a formation which occupies, in the Midland and Western counties of Wales, and in Shropshire and Cumberland, a very considerable area. I allude to the Cambrian and Silurian formation, which, at the hands of Sir RODERICK MURCHISON, has received an analysis which has most perfectly indicated its character and origin.

Composed of rocks in which the earliest traces of animal life are found (and these in limited number), the soils are generally thin and infertile.

These conditions, combined with the exceptional elevation of the districts referred to, almost take them out of the category of agricultural application. As sheep walks they are obviously valuable in connection with the farms which are found in the valleys, where the wash of ages has brought down a moderate (indeed, in some cases, a very considerable) depth of useful soil.

That these sheep walks may be greatly improved by inclosures, by planting for shelter, and by surface draining, I have no doubt; and with the present high prices of meat and wool, improvement in this direction may be confidently looked for and undertaken.

The granite formations of England are too limited in area, and generally too elevated, to need more than casual remark in a Paper of this kind.

Developed in two or three points in Leicestershire, but chiefly on Dartmoor and in Cornwall, their application is simply as runs for cattle; so that, important as they may be geologically, they are of the least value agriculturally.

I may not, however, omit to notice the excellence and

fertility of the soils of the decomposed basaltic rocks, which rise in isolated points through the granite and overlying formations adjoining, in Devon and Cornwall. Of very limited extent, they are greatly valued for their rich produce of grass and corn.

In concluding, I am painfully sensible how inadequately I have dealt with one of the largest and most interesting subsidiary elements of a surveyor's education. The accidentally short period allotted for the completion of this Paper has prevented my application to friends, on whose judgment I could rely for detailed information as to certain strata not immediately within my own knowledge and experience; but I am fortunate if this Institution will accept my remarks of this evening as a short suggestion of what, when amplified and enlarged by an abler hand, may be a most valuable contribution to the surveyor's library. I would press upon the Members of this Institution the study of this interesting science, not only as a part of their education, but because a knowledge of it, like virtue, is its own reward. Wherever we are, in our walks or rides, or railway journeys, it is an ever present theatre of instruction. As the wise Greek has said, "A temple ever near us;" and if the gain professionally may not be distinctly counted on, at least a source of ever recurring interest and pleasure is secured to the thoughtful observer.

TENANT-RIGHT FOR CHALKING.

When the area and price per acre have been agreed between the landlord and the tenant, the outlay, if made by the tenant, is repaid on the following scale, in the event of his leaving his farm :—

1st year,	to be allowed the whole cost.	
2nd	„ „	17s. 6d. in the £1.
3rd	„ „	15s. 0d. „

4th year to be allowed	12s. 6d. in the £1
5th " "	9s. 0d. "
6th " "	5s. 0d. "
7th " "	2s. 6d. "

Mr. J. H. LLOYD (Associate of Council) said that he had great pleasure in proposing a vote of thanks to Mr. SQUAREY, for the very interesting Paper which he had brought before the Institution. It was suggestive of very important considerations, and would be of extreme practical value to all persons connected with land, and who carried out the information to its conclusions.

Mr. T. SMITH WOOLLEY (Member), in seconding the vote of thanks, observed that he came to the Meeting expecting to be interested, and that those expectations had been more than realized by the able manner in which Mr. SQUAREY had brought the subject before the Meeting. The subject was one the importance of which it was impossible to overrate. He claimed to possess some little knowledge with respect to the relative value of different descriptions of soils on the various geological formations, in the districts dealt with by Mr. SQUAREY, and considered that the results given by him, with respect to the relative rentals, were very accurate indeed.

As regarded land situated on the magnesian limestone formation, it might, he thought, be taken, on an average, at the same rental as on the oolite series, the two soils being, on the whole, similar in respect of their agricultural characteristics. As regarded coprolites, he regretted that the great authority on the subject—Mr. BIDWELL, of Ely—was not present. So far as his own experience, however, enabled him to say, the presence of coprolites added from £100 to £150 per acre (according to the thickness of the vein and the depth of baring required) to the surface value of the

land ; that was to say, contractors would give from £100 to £150 per acre for the privilege of extracting them, binding themselves so to restore the land as to leave it in better condition for agricultural purposes than before. He might add that the demand for coprolites was becoming greater every day, and that the surface value above stated would also, no doubt, greatly increase. Admirable as the Paper was, it by no means exhausted the subject, and he hoped that Members who were familiar with the north and north-western parts of the country, and which Mr. SQUARBY had not dealt with, would follow the lead so admirably set by him.

Mr. H. M. JENKINS (Visitor) said that the subject of Mr. SQUARBY'S Paper was one which had attracted his attention, and excited his interest, for a long time past. Until 5 years ago, he had only considered the subject in relation to geology generally, as he then held the position of Assistant-Secretary to the Geological Society of London. Since that time his interest in agricultural geology had increased, owing to his connection, in a similar capacity, with the Royal Agricultural Society. He had always found it difficult to define the exact limits to be applied to the term "agricultural geology." By employing the term "surface geology," he had restricted himself to those deposits which were found at the surface, and had rejected, except with reference to the surface indications, anything which might be applied to the land as manure. Mr. SQUARBY, however, had been so good as to tell them that evening a great deal, not only about surface geology, but about agricultural geology in a broader sense, and had laid before the Institution a mass of facts gathered from his own experience. He (Mr. JENKINS) was not able, at so short a notice, to criticise the Paper; but he looked forward with pleasure to its publication; and after reading it, he and others, who, like himself, had been attempting to gather together some useful threads of infor-

mation, might be able to deal more satisfactorily, than at present, with the numerous interesting points for discussion raised by the author. At that moment, he would only say a word or two bearing upon general principles. In the south-eastern half of England, the secondary and tertiary rocks were to a great extent covered by the newer deposits which Mr. SQUAREY referred to under the terms "diluvial" and "alluvial;" but in that part of England, which was, to the greatest extent, the corn-growing portion of the country, those accumulations were of immense importance. For instance, wherever chalk was cultivated, and the land was ploughed, it was generally because the chalk which formed the escarpment was covered by these deposits; and, where these deposits did not exist, the chalk would not bear the expense of cultivation, and was left in "down;" but, in many countries, the large chalk escarpments were found covered with the deposit known to surface geologists as "clay with flints." On the other hand, in the case of river-valleys in clay deposits, it was found that where the land was ploughed, it was owing to the fact that certain superficial sands and gravels had rendered the land of comparatively little value for pasture. Where, however, the nature of the soil was such, that the detritus had made it richer, and suitable for being put down as pasture, it would be found that the latter form of cultivation prevailed in a favourable climate. Generally speaking, the proposition would hold good, that the relation which stratification bore to regular deposits was the same which, what were termed contour lines bore to surface accumulations, but in an inverse sense. In stratified rocks, the oldest were the lowest, in the other case, the newer accumulations were generally the *lowest*. These were some of the general principles which had been worked out, chiefly by TRIMMER; and he hoped, now that geological surveyors had been turning their attention more to surface geology in various parts of the country, that

some additional generalizations would result, which would be worthy of being regarded as the foundation of a science of agricultural geology.

Mr. T. SMITH WOOLLEY wished to contribute one little fact to the discussion, with respect to the chalk dressing which Mr. SQUAREY had referred to. On the Lincolnshire Wolds the average dressings of chalk were heavier than in the district to which Mr. SQUAREY referred, namely, from 100 to 150 cubic yards per acre, at an average cost of from 9*d.* to 1*s.* per yard, which, of course, raised the cost, per acre, from that mentioned by Mr. SQUAREY to £5 or £6 per acre; and the same principle of tenant-right prevailed, namely, from 6 to 7 years.

Mr. J. W. PENFOLD (Honorary Secretary) said that, as coprolites had been mentioned, he might announce that, during the session, a Paper would be read on that subject by Mr. BIDWELL, Jun., who would, no doubt, avail himself of his father's well-known experience in the matter.

With respect to the statement of Mr. SQUAREY, that hop land at Farnham, Surrey, was worth £8 per acre, he might mention that the father of his friend Mr. WOOLLEY, had, with great pains, some years since, divided the hop land of Farnham into six different qualities, for tithe purposes. He (Mr. PENFOLD) had let land which Mr. WOOLLEY had put in the fourth and fifth classes of quality at £7 per acre. The first quality of hop land was that called "The Heart Ground," close upon the town—in fact, occupying what would otherwise be the gardens and grounds of the houses in the main street. It was difficult to fix the rental value of this, as it was almost always occupied by the owners themselves. There was a tradition, however, that some had been let at £40 per acre. The value of the land did not consist altogether in the fact that in good seasons it produced so much more than surrounding land, but that in bad seasons

it produced a fair crop when other land produced next to none at all.

Mr. LLOYD asked what was the nature of the soil?

Mr. PENFOLD said that it was situated on the gault, and just at the edge of the upper green or Bagshot sand and the chalk.

Mr. T. SMITH WOOLLEY might mention that in the part of Bedfordshire to which Mr. SQUAREY had alluded, £7, £8, and £9 per acre was a common rent, even before the railway ran through Biggleswade. He would ask Mr. SQUAREY whether he knew anything of the history of the fertile lands near Penzance, as he found they were letting at £8, £10, and £12 per acre.

Mr. J. CLUTTON (Past President) said that, with the permission of the Meeting, he would briefly refer to a few geological facts in connection with the district in which he was born. His friend, Mr. SQUAREY, had referred only very slightly to one stratum situated between the chalk and the green-sand,—the gault. The gault, as Mr. PENFOLD was aware, came to the surface at Farnham, disappearing in some places along the valley, and in others extending over considerable areas. Now, in his early days, gault was not understood, and was considered an almost worthless soil. It was difficult to drain, and only very inferior crops could be produced from it; but of late years it had been rendered fertile by intermixture with other soils. He had found, from experience, that many growths, particularly of timber and herbage, flourished much more where the different soils were intermixed than upon any of those soils alone. He thought that Mr. SQUAREY had rather under-estimated the value of the Wealden soils. He believed that under ordinarily fair management the Wealden clay was capable of great improvement, and he did not

think it so bad for pasture purposes as his friend Mr. SQUAREY had led them to suppose.

He had no doubt that the Paper would have contained, had time permitted, some observations with reference to the effects of climate and elevation on soils,—considerations on which the value of land depended in a very important degree. He had himself laid down old ploughed land in pasture, in the Wealden district, and had found that, if it were properly done, it would let at from 40s. to 50s. per acre. In the neighbourhood of Reigate (the scene of his early experiences), land which formerly let at £1 per acre could, by ordinary management, when converted into grass land, be made worth from £2 to £3 per acre,—a fact which Mr. SQUAREY, who had seen the land, could corroborate. Only a part of that increased value was due to the increase of population and other similar causes, and was mainly attributable to improved methods of cultivation, and a better understanding of the capacities and nature of soils. The advantages resulting from an admixture of soils seem to have been, to some extent, appreciated by our forefathers. The Wealden district, it was known, was covered with old marl pits. This was also the case, to a considerable extent, in the counties of Kent and Sussex, and why their use had been discontinued he was at a loss to understand.

The vote of thanks having been carried **unanimously**, the discussion was adjourned until the next Meeting.

AT
THE ORDINARY GENERAL MEETING,

Held on Monday, December 8th, 1873.

THOMAS HUSKINSON, VICE-PRESIDENT, IN THE CHAIR,

The adjourned discussion on Mr. SQUAREY's Paper was resumed by

Mr. E. J. SMITH (Vice-President), who said that the father of English geology was a land surveyor, named SMITH, who as far back as the first years of the present century published an exceedingly accurate section, extending from Holyhead to the coast of Essex. That section was, he believed, very scarce, at least he had never seen but one copy of it. At a subsequent period (about 1828) SMITH predicted that coal would be found under the magnesian limestone of the county of Durham. Certain persons followed his advice, and were ruined in consequence; but others, undeterred by first failure, persevered in the enterprise, and demonstrated the truth of SMITH's prediction, adding two-thirds to the previously known coal-producing area of the country.

He (the speaker) had been accustomed to connect the successive geological series with the letters of the alphabet making the first formation correspond with A and the most remote with Z. This plan he would commend to any junior Member, as an easy method of acquiring and retaining a general knowledge of the science. In an alphabetical series

of the kind, the point occupied by London would correspond, say with the letter V: the letters W, X, Y, Z, lying to the east, and reaching to the English Channel. At the extreme end, at Z, a large proportion of the shells were found to be identical in character with existing forms; but, on receding from Z, the correspondence gradually decreased until, by the time the point corresponding with L or M was reached, their character was altogether changed, and the shells were found to be of a kind totally different. The farther upwards they went the more the fossils diverged from the existing forms, until at a certain place, which for distinction he would call B, the signs of animal existence altogether ceased, and the point was reached which he would term the azoic epoch.

Taking the position of London as corresponding with that of the letter V in the series, it would be found to hold good, approximately, that a section taken from V, either to Cornwall, to Aberystwith, to Cumberland, or to Scotland, would traverse the whole series of formations, corresponding with the letters of the alphabet, from V to A. The series, moreover, would be found to be constant, with this exception,—that if, at a particular point, any portion—say E—was not found between D and F, E was never found anywhere else. For instance, going from London to Cumberland, the alphabetical series would be unbroken until the point about corresponding with F was reached, but between F and A the continuity was arrested, and several of the remaining formations were absent. The circumstances occasioning the creation of E never happened again in the thousands and thousands of years during which the whole was formed; therefore E was either to be found between D and F, or not found at all.

Now, the admirable Paper under discussion dealt with the series — say from V up to H. The author had ex-

pressed his unwillingness to go further, but had suggested that some other Member of the Society should take up the subject from that point. He (Mr. SMITH) begged to say that he would be exceedingly happy, in the absence of a more competent person, to deal with the interval between H and A. So far, however, as regarded the portion of the country stretching westward to Cornwall, the subject could not be in better hands than in those of Mr. W. STURGE; and he hoped, in the course of the evening, that he would signify his acquiescence in the suggestion. If any other Members would kindly take up the remaining ranges of inquiry which he had indicated, the result could not fail to be advantageous to the Institution. The subject was so exceedingly extensive, that almost any practical surveyor could subscribe something towards filling in the details in particular situations; and he hoped that all who were able, in any form, to assist in getting out a complete story of the agricultural bearings of geology, would be disposed to contribute their aid.

Mr. R. B. GRANTHAM (Associate), after indicating on the geological map the principal formations to which Mr. SQUAREY had referred, and commenting on their area and distribution, remarked, with reference to the Paper generally, that his occupation had led him rather in the direction of structural than of surface or what was termed agricultural geology. What knowledge of surface geology he possessed had been gathered from his experience in draining in every variety of soils, and he had found it very useful in determining when land might or might not be drained with advantage, more especially clay lands, where the rainfall was a very important element in considering the question of drainage. He had, at various times, been called upon to deal with questions of agricultural engineering, more especially with marling, on a very extensive scale, and he quite endorsed the opinions

which had been expressed with reference to the advantages arising from a judicious admixture of soils. He might refer for a moment to marling as it was carried out in the Forest of Delamere, and of which he had written a descriptive Paper, published in the twenty-fifth volume of *The Journal of the Royal Agricultural Society*. The whole of the Forest of Delamere was on the new red sandstone. The surface consisted of different soils such as sand and gravel, more or less mixed,—some better and some worse—and peat. It was marled from the boulder clay, the marl being found in two beds, situated about a mile from each other, and totally differing in consistency and character, one being a slate marl and the other a clay marl. He had given an analysis of these marls in the Paper to which he had alluded. In some cases, as much as 180 tons to the acre were put upon the land, in others 80 tons, the average being about 100 tons. It was Mr. CLUTTON's opinion that the operation of marling the land at Delamere might, with more advantage, have been performed at two distinct periods; and that the benefit arising from the process would in that case have been of a more enduring kind; but however that might be, there could be no doubt that the financial results had been successful, and that the land had given a good return in the shape of rent. The greater part of the cheese land of Cheshire had, he believed, been reclaimed by the use of that very marl. The pits in almost every field were familiar objects to those who travelled through the county of Chester. The history of this operation was an instance, and he thought a striking one, of the agricultural uses of a knowledge of surface geology.

The treatment of the peat lands of Somersetshire was interesting in its bearing on the subject of the Paper. He might remark, incidentally, that he had reported to the

Government on the recent floods in Somersetshire, and his report would be found in the library. On the peat lands he had mentioned, the soil was taken from underneath the peat. It was an alluvium of a character very nearly similar to that deposited by the sea on the banks of tidal rivers, and was enriched by the washing down of the detritus from the high lands surrounding these marshes. He might mention that the Bath brick was made from the deposited warp taken from the banks of the Parrett, in Somersetshire, consisting of a loamy sand. These alluvial deposits were spread over a portion of the peaty surface, and formed a soil of considerable fertility. He had seen, in Ireland, a great deal of the wonderful effects of the washing down from the limestone formation in the production of pastures of extraordinary richness. Indeed, the general fertility of that country was due in a very great degree to this circumstance. Another direction in which a knowledge of geology was likely to be of service to the surveyor, was in enabling him to judge of the likelihood of obtaining water in localities unfavourably situated with regard to rainfall, and in guiding him as to the depths at which the water-bearing strata would probably be reached, and also as to the probable chemical qualities of the water.

In reclaiming lands from the sea, it was most essential that the surveyor should possess a knowledge of agricultural geology, in order that he might know the nature of the soil which formed the land to be inclosed, and be able to determine whether it would be worth the outlay.

MR. T. SMITH WOOLLEY (Member) said that there could be no doubt of the importance of the scientific services rendered by SMITH, who had been rightly styled the father of English geology. Indeed, he occupied the same position here, with regard to that science, as CUVIER among the French.

While fully appreciating the uses, to the surveyor, of such a knowledge of geology as was advocated by several speakers, it was, he thought, of little or no utility in the valuation of land for rental. In other respects, however, its possessor would find it of great service. Without it, important elements in the value of land, arising from the presence of valuable substrata, were likely to be overlooked by the surveyor. He might not be aware, for instance, that gypsum was likely to be found in the Keuper marls of the new red sandstone; that coprolites might be looked for in the upper green-sand, or iron in the lower oolitic series; and his ignorance of the possibility of their presence beneath the soil, might be seriously detrimental to the interests of those who trusted to his knowledge and skill in advising them as to the value of their property.

He was acquainted with an estate in North Lincolnshire, which, 10 years ago, was supposed to be one of the poorest in the county, worth perhaps £30 per acre. Almost by accident, ironstone had been discovered, and at the present time there were, on that estate, eight or ten blast furnaces. The value of the property was increased sevenfold, and might go on increasing indefinitely.

This case, by the way, happened to illustrate the unwisdom of carelessness as to the exercise of manorial rights, under the impression that they were worth nothing. After fighting the question through all the courts, and the House of Lords, A was decided to be the owner of the minerals, because he or his predecessors, by the regular collection of small quit rents, had established their claim to the manor and minerals as against B, who was the original grantee.

As he said before, he did not believe that geology would be of any assistance in valuing land for rental purposes, owing to the endless varieties of soil on each

formation. It was an art which could not be learned from books, and the "rule of thumb,"—or in other words, judgment and experience,—was the only serviceable method as regarded that branch of their profession.

There was one point on which, if he understood Mr. SQUAREY rightly, he could not quite agree with him. He understood him to say that the richer alluvial soils were mainly produced from the older rocks; the poor sand of Morecombe Bay, derived chiefly from the silurian rocks, strongly contradicted this view. With respect to the rich wash lands of the east coast, his (Mr. WOOLLEY's) impression was that they were not derived wholly from the rivers, but in great part from the abrasion of the coasts of Norfolk, Yorkshire, and Lincolnshire. He would give a case in point. About 40 years ago a bank was carried across "Cross Keys' Wash," at the outfall of the Nene, and a very large tract of poor sandy land was recovered. Twenty-eight years ago a tract of 2,000 acres on the seaward side of that bank, was taken in: his father acting as valuer for the allotment, and he (Mr. WOOLLEY) assisting in the work. Between the date of the first bank and the second, the "warp" or alluvium between the two had risen, on the average, 6 feet. He saw that newly inclosed area a few days since. It was as good corn land as he had ever seen, and a most striking contrast to that inclosed in the first instance.

The universal richness of alluvium was alluded to by Mr. SQUAREY; but there was not, as he seemed to imply, anything like a uniform scale of goodness. In Lincolnshire, and also in Romney Marsh, Pevensey, and elsewhere, it was common to find poor, cold grass land side by side with most magnificent marsh pastures, worth £3 or £4 per acre, the land being on the same level and alike in all external

circumstances. He was at a loss to account for it; but it was one of the many difficult problems which occurred in their profession.

One other point to which he took exception was the alleged good management of land in the vicinity of London. That remark might apply to a radius of 8 or 10 miles round the metropolis; but the zone lying between that and a 20 mile radius was about as badly managed as any land he knew of in the whole country. Since the last Meeting he had verified the figures which he then gave with regard both to the quantity and cost of the chalk marling on the Lincolnshire and Yorkshire wolds, and he found that he rightly stated the former amount at about 150 cubic yards per acre, which, as a cube yard weighed nearly a ton, was a far greater quantity than was applied to the land mentioned by Mr. SQUAREY, and the average cost was from £4 15s. to £5 15s. per acre. He questioned whether the natural productiveness of the soil, referred to at page 17 of the Paper, was attributable to the enormous quantity of animal remains in the underlying rocks. It was due rather, he thought, to the nature and depth of the soil than to the kind or quantity of the fossils in the substrata. Some of the surface soil, indeed, on the formations referred to, was among the poorest under cultivation. With reference to a remark which fell from Mr. SMITH, he (Mr. WOOLLEY) might observe that he had some knowledge of the coal districts of Staffordshire, Warwickshire, Durham, Derbyshire, and Northumberland. They were chiefly, more or less heavy working clay, and his opinion with regard to the surface land was that its rental value ranged from 18s. to 32s. per acre.

Mr. E. RYDE (Member) said that he should be sorry to

let the occasion pass without expressing his thanks to Mr. SQUAREY for his excellent Paper. He was one who thought that the future success of the Institution depended upon the character of the Papers read at its Meetings; and, when a practical man of Mr. SQUAREY'S experience took the trouble to prepare such a Paper as this, the Members of the Institution were deeply indebted to him. He quite agreed with the author that the subject was one full of interest to the younger Members of the Institution, and, without presuming to dictate to them, he would seriously advise them to study it, notwithstanding what had fallen from Mr. WOOLLEY.

He understood that gentleman to say that a knowledge of this subject for the purpose of valuing land, or rather for fixing the rental value of land, was of little practical use; but surely a knowledge of what was underneath the soil must be very essential indeed in estimating the value of the soil itself. For what, after all, was soil? He might be wrong in his opinion; but, speaking generally, he had always been in the habit of regarding soil as nothing more than decomposed subsoil. How came it there if it was not what he supposed it to be? There was, he believed, a most intimate connection between the soil and the subsoil. He quite agreed with Mr. WOOLLEY in his opinion that the art of valuing land could not be acquired from books; indeed, looking to the startling prices which land occasionally fetched—prices which exceeded all reasonable anticipations—he was sometimes inclined to believe that experience itself was of equally little service as a guide. The author had limited his observations to the geological formation of the subsoil, without reference to the soil which rested on it. He (Mr. RYDE) was of opinion that the soil should not be entirely unnoticed. The soils

of England might, he thought, be classified in some such way as this :—First, the alluvium. Secondly, the heavy wheat and bean land, the clay land—a soil which was very productive, when certain agricultural conditions were properly observed. Thirdly, what was known most familiarly by the name of barley and turnip land—the light, sandy, and gravelly soils. Those soils were very variable in quality, some, however, being extremely good. The sandy loams in this country were amongst the best land to be met with ; and if a man wanted to farm for pleasure, and a little profit as well, he could not select better land for his purpose than good sandy loam. Fourthly, the class of land in which lime was predominant—the calcareous soils. These four classes would, he thought, include the whole of the soils of this country. He would suggest that these four distinct kinds of soil might be associated in the following manner with the various geological formations referred to by the author :—

1. The alluvium, as described by the author of the Paper.
2. The clay lands, or adhesive and retentive soils, which would be found overlying the plastic and London clays, the Wealden clay, the gault, and the Oxford clay.
3. Sandy and gravelly soils and light tillage land overlying the old and new red sandstones, the green-sand, the millstone grit, and the granite formations—soils which are friable, porous, and easily cultivated.
4. Calcareous soils, containing lime in considerable quantities overlying the chalk, the oolites, and the carboniferous limestone.

It was impossible, he thought, to arrive at anything

like a general estimate of the rental value of these lands; and the rental value of the same species of soil fluctuated according to the various degrees of fertility arising from differences of situation and altitude.

The opinion of Mr. CLUTTON was entitled to much greater weight than his own; but he could not agree with him in his idea that Mr. SQUAREY had put the Wealden clay at too low a rental value. It seemed to him, on the contrary, that Mr. SQUAREY's error lay rather in the opposite direction. Perhaps the difference of opinion was capable of explanation, for, in another part of his remarks, Mr. CLUTTON had said in substance—"You can have no idea of the capabilities of the Wealden clay until you have tried it." Mr. CLUTTON spoke, he fancied, from somewhat exceptional circumstances, as he had two farms—an urban and a suburban—and the crumbs from the richer farm had probably fallen upon the poorer one, and the latter had very much benefited by it. If Mr. CLUTTON went about 5 miles further east, in the neighbourhood of Godstone, he would come to that part of the Wealden with which he (Mr. RYDE) had had dealings, on behalf of the South Eastern Railway. The clay land in that district was some of the poorest land he had ever met with. No man could do any good with such land unless he had a pretty deep pocket as well as great spirit and enterprise. As a matter of fact, land near Maidstone, taken at a high rent, would be cheaper than land in the Weald at no rent at all.

With reference to the remarks which had been made as to the rental paid for the hop land at Farnham, he might mention that, in 1846, he surveyed the whole of the hop lands of that parish, the rental value of which was about £20 per acre. The highest rental given for the

“heart land,” within his personal knowledge, was £25 per acre. It was not always let to farmers, but was often held by tradesmen of the town, who liked to have little pieces of hop land. The more general dealing with that land was the purchase of the fee simple, and he had known as much as £500 per acre paid for it. The best land did not go quite as far north as the Bishop of WINCHESTER’S Palace. A little south of that point the green-sand appeared.

Mr. R. C. DRIVER (Member) remarked, by way of confirmation of Mr. CLUTTON’S views, that he had recently been over two estates on the Wealden clay. One of them had been under-drained and dressed, and a considerable portion laid down with grass. It was now worth 30s. per acre,—a very large increase upon its previous rental value. He had recently been over the adjoining estate, with a soil of precisely similar geological character. That was wholly unimproved. The land was saturated with moisture, and was let to impoverished tenants at from 8s. to 12s. per acre. This was strong proof of Mr. CLUTTON’S statement that the Wealden clay would pay for more attention than it had hitherto received.

Mr. H. M. JENKINS (Visitor) said that he had obtained, from the Geological Survey of England, the loan of two or three maps (which were exhibited for the inspection of Members), showing the relation between the stratified and the superficial geology of the country. SMITH, the geologist, had illustrated, in the early map which had been referred to, what was generally known as geology proper. Mr. E. J. SMITH’S idea of symbolizing the stratified formations by so many letters of the alphabet was a happy one, and he

would ask the Institution to carry the idea a little farther, and allow him to assume that each of Mr. SMITH's big capital letters had become broken up into a number of smaller letters of the same denomination, so that any number of the same letters might be used to signify different portions of the same formation. The superficial accumulations covering the regularly stratified formations indicated by the big letters, could then be designated by the smaller letters, and thus indicate the rocks from which they had been derived; but these small letters would not be found arranged regularly as the large ones were.

On one of the two maps exhibited, the true geological formations, as referred to by Mr. E. J. SMITH, Mr. SQUAREY, and Mr. GRANTHAM, were seen arranged in parallel lines, running, approximately, north-east and north-west, the brown colour covering the whole district known to geologists as the London clay. This map dealt exclusively with the London clay, and showed no superficial deposit, except a spot or two here and there along the channel of the Thames.

It would be seen, on the contrary, that the other map, which represented precisely the same country, showed, by the various colours, the deposits which came up close to the surface, and were covered only by the soil. In point of fact, the latter map represented what was known, agriculturally, as the subsoil of the area, whilst the former represented the ordinary geology of the same region. It would be seen that the greater portion of the large area, coloured brown on the first map to represent the London clay, was variously tinted on the second map to show the different superficial deposits which overlie the clay, and leave it exposed in isolated patches only. A large area on the first map was

coloured green to represent chalk, while on the second map very little of that colour could be seen, owing to the tints representing the sand, brick-earth, and gravels, which covered the chalk. Probably not one-sixth of the chalk, shown as such geologically, formed the actual subsoil of the chalk district. These deposits above the chalk varied considerably in thickness. They consisted of gravel or clay, or a mixture of both, the "clay with flints" predominating, and sometimes attaining a thickness equal to the ordinary stratified deposits. In the same way it would be seen that, in the county of Essex, represented on the small map, very large portions of the formations were covered over by superficial accumulations to such an extent, that maps showing the geology proper were practically useless for agricultural purposes. The Geological Survey, he was glad to say, were re-surveying a great part of England in the way depicted on the second map, showing the superficial deposits, and they were issuing the copies as fast as possible to the public. It was well known that when Government undertook a work, it was prosecuted with greater or less energy in proportion to the degree of interest shown in it by those whom it chiefly affected. He felt strongly that if the agricultural public—if surveyors especially—did not show any great interest in these maps, their completion was likely to be delayed for a very long time, and he had therefore asked the director of the Survey whether he would allow any gentleman who might wish to do so, to inspect the work in progress. The reply was, that at all times he should be happy to afford surveyors and others any information in addition to that which had at present been published.

Mr. W. STURGE (Member) said that he had intended to

make a few remarks on the details of the geology of the west of England, but he would refrain from doing so, hoping at some future time to comply with Mr. SMITH's request, and endeavour to supplement the very able Paper prepared by Mr. SQUAREY, by a description of the surface geology of the south-west of England, a part of the country with which he was more particularly acquainted. So far as regarded Cornwall, however, he might mention that it was a peculiar district, geologically, embracing the great metalliferous strata, and his acquaintance with it was very limited. He hoped, therefore, that some Member who lived further west than he did, would be found willing to deal with that part of England. Those districts with which he was more particularly familiar, probably embraced a greater variety of soil and geological strata than any other, and he should be happy to do his best towards describing their agricultural geology.

Mr. SQUAREY, in reply, said that the lateness of the hour precluded him from dealing, at any length, with the many interesting points raised in the course of the discussion. He hoped, however, on some future occasion, when the subject was again brought, as promised, under the notice of Members, to avail himself of the opportunity of adding a few remarks, by way of reply, to some of the observations which had been made on his Paper. He had approached the subject with great diffidence, and was glad to have been the means of eliciting a promise from Mr. SMITH and Mr. STURGE to take up the story where he had left it, and do their share towards the completion of this very useful and interesting investigation. He must explain that his Paper did not pretend to go into questions of technical geology. He had sought to give it a practical shape, and to incorporate with it as much useful matter as could be compressed

within the prescribed limits of such a Paper. Referring to the discussion which had taken place, he might observe that "clay" was not clay of the same nature in all places. The same treatment applied to the London clay in Hertfordshire as to the Oxford and Kimmeridge clays, even under the same conditions of climate, elevation, and rainfall, would result very differently. The same remark held good as applied to the sands and gravels of the tertiary as compared with those of the new and old red sandstones. On comparing the productive capacity of the sandy gravel, which was the basis of the soil in the lower valley of the Avon, with the soils of the new and old red sandstones of Devon, it would be found that the natural difference of fertility was immense, although the two soils were nearly identical in their texture and depth.

The depth of the soil and its capacity for decomposition had been rightly pronounced to be elements of fertility and value; but a cubic foot of soil taken from the Oxford clay or lias contained a much larger amount of natural organic fertilizing elements than any ordinary clay or sands. He was rather surprised at Mr. CLUTTON's defence and estimate of value of the Wealden and gault clay. He (Mr. SQUAREY) admitted that the gault was a good soil, if thoroughly well managed, but the instances were rare in which that was the case, and they were not soils which in ordinary hands were profitably dealt with. He might mention, however, with reference to these soils, that Mr. ROBERT CLUTTON had, on his farm at Reigate, by long and careful management, converted land of low natural value into remarkably good pasture land. Not only had he done so, but he had also endowed it with the capacity to fatten animals; adding a certain amount of "proof" to the soil by a long course of skilful and liberal treatment; but this

result could not be looked for, as he had said, in ordinary cases.

With reference to Mr. WOOLLEY's objection to his remark, that the best alluvial soils were due to the wash of the older formations, he might explain that, in speaking of the older rocks, he (Mr. SQUAREY) did not refer to the granitic or silurian systems, but to the decomposition of the red sandstone, lias, oolites, and the chalk. The absence of uniformity, in the quality of the alluvium, alluded to by Mr. WOOLLEY was, he thought, readily explainable. A current flowing where alluvium had formed, might bring with it large quantities of gravel, in one place producing that denudation which frequently occurred in alluvial districts, and in another leaving the alluvium intact, or mixed with gravel in various proportions. It might very well happen, in such a case, that a particularly fertile area of soil might be washed away, and be replaced by gravel drift of comparative infertility.

In conclusion, he begged to thank Members for the kind way in which his efforts had been received.

The CHAIRMAN said that, although the discussion had occupied a considerable time, it had not flagged in interest, and was by no means exhausted. He was sorry that it was not possible to adjourn it to the next Meeting; but he regretted it the less, inasmuch as, before long, an opportunity would be afforded of continuing the discussion with more advantage than at present. The kind promises of Mr. SMITH and Mr. STURGE to reintroduce the subject at an early date, would, he hoped, result in the communication of much practical information, more especially as regarded the agricultural features of the question. Had time permitted, he would have been glad to add a word

or two to the discussion. He might just mention that he agreed with Mr. WOOLLEY that geology, in its present form, was of small value to surveyors so far as regarded the valuation of land. Rainfall, elevation, and temperature were, in his opinion, more important elements for such purposes than the constitution of the soil. He would reserve any further remarks till a future occasion.

The Meeting then adjourned.

THE
LANDS CLAUSES CONSOLIDATION ACTS,
WITH SOME
SUGGESTIONS FOR THEIR AMENDMENT.

By F. A. PHILBRICK, ASSOCIATE.

*Read at the Ordinary General Meeting of the INSTITUTION OF SURVEYORS,
January 5th, 1874.*

EDWARD NORTON CLIFTON, PRESIDENT, IN THE CHAIR.

“The Lands Clauses Consolidation Act, 1845,” with the amending Acts of 1860 and 1869, presents one of the not very numerous instances to be found in our Statute Book of a complete code of law, applied to a particular subject.

In bringing the leading provisions of the system mainly founded on these Acts, before the Institution, it will be convenient to glance, first, at the necessity for positive enactment; then to investigate briefly what are the requirements which legislation has to fulfil; next, to examine how far the law as at present existing answers those requirements; and, lastly, to offer some suggestions for remedying such defects as, in this scrutiny, may be apparent.

By the common law of the land no subject of the realm can be compelled to part with his property to any other subject, whether it be to a private individual or to a corporate body of any of the kinds of corporations having legal existence.

But as population multiplied, as wealth increased, as

commerce spread, and consequently as large masses of the people were attracted to the chief cities and towns of the country, the wants of communities and individuals also became greater.

These wants, from the nature of the case, were too vast to admit of their supply being within the resources of any one individual: hence the need of a joint undertaking, on endeavouring to form which it was at once perceived that the undertakers must be furnished with Parliamentary powers enabling them to obtain, without their consent, the property of others; otherwise it would be competent to any land-owner, by withholding his consent, to render the scheme impossible.

As one might predict, it was in this great City of London that the necessity was first apparent for works which required the resources of a public body to carry them out, and the want which produced the first undertaking of the kind was that of a supply of water.

I do not class as strictly belonging to the present discussion the various Acts relating to sewers, or, as they are in modern phraseology more properly designated, provisions for the formation and maintenance of sea walls or defences of lands subject to overflow. These Acts made their appearance on the Statute Book in the 23rd of Henry VIII. (1532.) The leading features of their enactments, so far as they incidentally touch on the subject of this Paper, seem to be conceived on the principle of giving powers to the Commissioners, who are to put the Acts into execution, to construct and maintain defensive works on the lands of others, but not to enable the Commissioners to acquire the lands themselves.

We are accustomed to speak of public undertakings which involve the acquisition of land by compulsion, as the creation of modern times, and, in the main, this is a correct

assertion. It is during the present century, and chiefly during the last 50 years, that the great development of enterprise, in promoting works of a public or *quasi* public nature, has taken place. The marvellous results achieved by the general spread of railways over the face of the country are so striking, and moreover so recent that, in their immensity, we are apt to lose sight of the fact that more than two centuries ago it was found necessary to frame a scheme for the acquisition of land under Parliamentary powers in order to secure a supply of pure water to the Metropolis.

The earliest statute of this nature is, I believe, the New River Company's Act, passed in the 3rd year of James I. (1605.) By that Act, the mayor and commonalty of London and their successors were authorized to acquire the necessary lands for the purposes of making a cut or channel to supply London with water from Chadwell and Amwell; and the terms in which the duty to make compensation was imposed, contain the germ of the many subsequent enactments framed with a similar intention. It may, therefore, be interesting to quote them.

"In consideration whereof, the mayor, commonalty, and citizens of London, and their successors, shall make such satisfaction or composition to and with the lords, owners and occupiers of the same grounds through which the new cut or river shall be made, and with all such person and persons as shall sustain *any damage*, loss or hindrance in their mills standing upon any of the rivers or streams from which the water shall be taken through the said new cut or river, as shall be to the contentment of the lords, owners, and occupiers of the said grounds and mills; and in default of their agreement by mutual assent, such satisfaction or recompense as shall be limited and appointed by the commissioners to be assigned for that purpose, according to



the intent of this statute, by the lord chancellor, or lord keeper of the great seal of England for the time being, by commission under the great seal of England, or by any nine of them, whereof four of them to be citizens of the city of London."

The tribunal appointed to settle the terms of the purchase, and to fix the satisfaction to be accorded to the injured mill and land-owners, was, it will be observed, of a public nature; it united—as the "*juré d'expropriation*," under the French system, does to this day—the functions of judges and jury. It did not provide any rules for determining how the assessment was to be made, but rather left it, generally, to the practical good sense of the Commissioners to do what they might think fair in each particular case.

In the state of society prevailing at that time, this enactment seems as much as could be expected, and likely to work complete justice, if administered by an independent body.

How the land-owners were treated, tradition is silent; but how enormously the property acquired by the undertakers has, since its development by them, increased in value, is a matter on which many Members of this Institute can speak with the authority of experience.

I may notice in passing, as analogous to the Sewers' Acts already mentioned, the Act of the 15th of Charles II., for the drainage of the Bedford Level, which, with its numerous following enactments, contains matter of great interest on a collateral inquiry, viz.—how lands created or benefited by a great public work, undertaken by a body of adventurers, should be made to contribute to the cost thereof.

I now come to more modern times, when the needs of water supply, of water communication, of roads and bridges, of streets, docks, and other improvements of a public character, involved the obtaining of statutory powers to effect these various objects. Special Acts were applied for

in each individual case, and powers sought to obtain the lands requisite. These powers appear to have been granted whenever a fair necessity was made out, since the instances of their grant are numerous ; and, in these Acts, of which the New River Company's Act was the precursor, the powers were at first conceded in varying terms, depending, probably, much on the frame in which those who asked the intervention of Parliament drafted the language of their Bill, but always containing provisions for making satisfaction to the land-owner whose property was taken. Towards the latter portion of the century, these applications became more numerous, and the various Acts passed show more uniformity in their provisions in this respect. Each set of applicants submitted to Parliament the terms on which they sought to be entrusted with compulsory powers, and, as may be expected, considerable differences are to be found in the terms on which the various promoters obtained them.

It would be profitless to search through the multiplicity of these Acts in the hope of extracting a principle, and useless, even if the search were successful, because the Lands Clauses Consolidation Act of 1845 is general in its provisions, and expressly applied to every undertaking which requires for its purposes Parliamentary sanction and authority to purchase or take lands. Having thus seen how the need for such an Act arose, we can the better understand that the two great objects for which "The Lands Clauses Consolidation Act, 1845," was passed are, as declared in the preamble, "to secure uniformity in the provisions then usually introduced into Acts authorizing the acquisition of lands for undertakings or works of a public nature, and to the compensation to be made for the same, and to avoid the repetition of similar enactments in each special Act."

It may accurately be said that the subject of the Act

is the acquisition of the lands of others *by compulsion*. A considerable portion of the Act, it is true, speaks of the purchase of lands *by agreement*; but this power of purchase by agreement is expressly limited (8 & 9 Vict., cap. 18, s. 6) to those lands which, by the special Act, are authorized to be taken, *i.e.*, such as are within the limits of the compulsory powers.

Two great branches of the subject present themselves at the outset. The taking of land, or any interest in it, involves a purchase—the purchase of that land or interest, and the subsequent application of it (with the other lands acquired by the promoters) to the object of the undertaking may involve damage or injury to the former owner of the land or to others, which, when it happens, requires compensation.

The Lands Clauses Acts deal with both these branches, and it will be seen, as I proceed, how desirable it is to keep them apart, and that confusion is likely to result unless this be carefully attended to.

In pursuing the order I had prescribed at the commencement of this Paper, let me first investigate the requirements which the framer of the law on this subject has to satisfy.

It must be remembered that we have to consider positive law, *i.e.*, law laid down in enactment,—the creation of the will of the lawmaker.

Obviously, therefore, he should first know exactly what he intends to effect; be able to express that intention so as to be clearly understood, and be capable of devising proper machinery to carry that intention into execution.

Thus the principles on which purchase and compensation should, respectively, be made are to be laid down. The mode by which purchase and compensation are to be carried out have to be provided.

A purchase of real estate, or land, or of any right to

or interest in it, involves three essential things. First, parties able and competent to contract. Secondly, a defined subject matter of the sale by the one, and purchase by the other, of those parties. Thirdly, a price agreed on.

A sells Blackacre to B for £1,000 is the simplest form expressing these essentials.

The sellers, in the case of a bargain made by law as distinct from one made by the act of the parties, must, where the object is acquisition of the fee simple in the land in order to devote it to the purpose of the undertaking, comprehend all those who have any interest present or future in the land, otherwise the promoters would fail to acquire that which is indispensable to their undertaking. Every interest, including those of owners who are under incapacity, or have limited interests, annuities, or charges issuing from land,—in short, all species of incumbrances known to the law,—must be dealt with. These and other matters which affect land, as the redemption of land tax and the enfranchisement of copyhold tenures, must be provided for before the object can be attained, viz.—that of putting the full dominion of the land, as freehold without charge or incumbrance of any kind, into the hands of the promoters.

The purchasers are, in every case, the promoters, and, as they are incorporated and have perpetual succession, no difficulty can arise as to fixing who they are.

The third requisite is the fixing of the price. On what principles ought this, the important feature in the inquiry, to be done?

A man has his land, and, *ex concessis*, is not desirous to part with it. He has acquired it, perhaps at an extravagant price, to gratify private sentiment, family tradition, or to remove the presence of annoyance to his other property. On the other hand, it may be, he has bought it merely as an

investment for spare cash. This land is taken from him by compulsion. Is he to be treated alike under all these circumstances? As respects the individual owner, and regarding his personal views, it clearly would not be equitable so to do. No money would have tempted WARREN HASTINGS to part with an acre of his dearly loved Daylesford. Even when hard pressed for money, Lord BYRON would not listen to the repeated offers made him to sell Newstead. A characteristic letter of his on the subject begins—"God, the Devil, and Man, conspire to make me an unhappy wretch for want of means; but by the help of the first, the second and third shall never make me sell Newstead. My father's house shall not be made a den of thieves."

Again, a man may, in the full exercise of his proprietary rights, have chosen to spend on his property thousands of pounds in an outlay of an utterly unremunerative character. A case occurred near London, not very long since, where the owner had fitted solid mahogany doors to his rooms, solid oak wainscoting to his passages, and had all the appointments and fittings rendered in a material and of a style which cost many times the figure at which equally efficient articles of an ordinary nature could be procured. Is such a man to be paid no more than the less fastidious or less extravagant owner (which you will) who has only expended such money on the estate as, in the ordinary judgment of mankind, was prudently laid out? Nay, I go further. Any large country house, as the experience of many in this room will bear out, must cost to erect, a much larger sum than any rental it would command would yield a fair return upon in the shape of interest. In other words, he who builds a large country house, necessarily sinks his capital, to a greater or lesser extent.

If this house be taken by compulsion, is the owner to be paid what it is worth, or what it cost him ?

The former does him an injustice, because he does not desire to sell ; the latter would do the promoters injustice, because they would be paying for that which they do not get. They possess no affection for the spot, and inherit no feelings of ancestry, but simply require the site for the purposes of their undertaking.

The illustrations I have put, show that there may be instances where lands may be taken for which no price would tempt the owner ; others, in which the mercantile or commercial price would not be a recoupment of the outlay made.

Obviously, therefore, from the owner's point of view, a sale at the commercial value would do him a manifest wrong.

But a legislator must not dwell exclusively on the views of one party ; he must consider both. That which the promoters acquire is a certain fixed unmoveable property, with its accessories and advantages, actual and prospective. For thus much it is clear they must pay. Is it right that the purchase-money should vary according to the peculiar personal likings of the owner, and the accidental circumstances of the greater or lesser expenditure of himself or his predecessors thereon, whether or no such expenditure has been prudent in conferring value on the property ?

If so, then should not the promoters, in all fairness, be entitled on the other hand, to acquire property to which the owner had an aversion, at a considerable discount ; and yet how, in practice, could such a question be solved ?

Remembering that he has to fix a principle for all cases, will it not be wise for the lawmaker to regard the great majority,—the ordinary class, those to which ninety-nine times in one hundred the law will be applied,—and disregard the

special and exceptional instances and the occasional hardship they may work ?

Surely he would be right in doing this and in eliminating the personal element from his calculations, making the parties deal on the footing of a purely commercial transaction, taking care that it is attended with sufficient liberality to the ordinary owner to prevent a sense of injustice being left in his mind by the operation of the law. By no other rule could he attain any certain result ; and all who know the great evils which uncertainty in the law produces, will concede that some sacrifice is well made if it be achieved.

But thus far the transaction has been considered as if it were one voluntarily entered into,—as if the seller were willing to part with his property.

This would ignore the presence of the indispensable ingredient—compulsion. Whether the owner has put a *pretium affectionis* on his land, or regards it with dislike, in either case he is not the party who seeks to sell, it is the promoters who ask to buy. How, then, shall the bargain made by legislative interference be assimilated and adjusted to that which, if free, the seller would presumably (after excluding the personal considerations already referred to) be willing to make for himself?

The only solution possible would be by an increase of the price, varying according to the circumstances of the case.

If he attempted to define this increase, to fix any rule by which to calculate it, nay, even to prescribe that it must be always made, the legislator would find himself almost hopelessly adrift ; he would have to resort at last to the expedient of leaving the entire question an open one, at the discretion of the tribunal which has to fix the purchase-money after hearing all the facts of the particular case.

Therefore, he would prudently entrust the duty of arriving at the purchase-money to a competent and fair tribunal, in such terms as to permit and warrant the exercise of a full discretion in this respect.

The principles above laid down, if sound, are universal, and apply to all the different species of property that can be held, whether freehold or copyhold in tenure, whether leasehold for years or lives, whether consisting of tolls or other rights of seignory, whether annuities or rent-charges, and whether the interests in such be greater or lesser.

The purchase-money having been assessed in principle under the provisions thus made, no further consideration will arise in cases where the land taken comprises the entire holding of the particular owner,—he is completely bought out; but it may occur that either the residue of his property is so small as not to be worth a separate holding, or so awkwardly circumstanced, by the taking of the rest, as to be worthless, or nearly so. In such cases the promoters ought to be compelled to take the same, or, at the land-owner's option, to pay a severance damage, necessarily limited by the fee simple value of the land damaged.

But when all this has been done, there remains, in most cases, the difficult question how far does the taking of the land for the purposes of the works affect, in an injurious sense, the other property left to the land-owner, and how ought compensation for such damage be assessed in principle? *

Under the head of damage—of injuriously affecting—every kind of depreciation of which property is capable may be classed, whether arising simply from severance, the physical cutting off of one portion of the property from the remainder, and the consequence of thus detaching it, or from the general results attendant upon the construction and use of the works in the undertaking sanctioned by the

special Act. A few instances may be of service as illustrations :—The remaining land may be drained of its surface or underground water ; or its system of drainage, natural or artificial, interfered with ; the various elements of enjoyment (now often classed under the head of “ amenities ”) may be seriously curtailed, if not destroyed ; an unsightly embankment may rob the principal windows of the mansion of the view which was its peculiar charm ; a heavy mineral traffic may be brought into proximity to a hitherto quiet country retreat ; a near way may be stopped up ; a level crossing may be interposed before the principal entrance gates ; a tract of land may be destined for the daily reception of the sewage of a large town, or for gasworks. All these are instances which have actually occurred.

Another group of cases where the damage is not less real, will readily occur to the mind. The construction of the works may, either permanently or temporarily, divert a stream of traffic, the flow of which confers a material element of value on the premises, in a commercial point of view. This may result from physical obstruction to a neighbouring highway, as in the Pickled Egg case ; or from the opening of a nearer and more commodious thoroughfare, and consequent desertion by the public of the former route. To the latter class may be referred the damage sustained by the old posting-houses when the coach traffic was superseded by railways.

Two primary considerations will at once occur in attempting to frame a system which shall deal with claims of this nature. There must, in order to establish the claim, have been an injury sustained, and a right to receive compensation for such injury. The one is a question of fact, and the other of law. Incidentally, in the former, arises the question of the *extent* of injury, or *quantum* of compensation, which

may vary from nothing to the full value of the interest of the claimant in the property injured.

It is clear that the persons who may have to pay the compensation, must, in justice, be entitled to dispute both the right to any, as matter of law—that is, to deny the claimant's title,—and also to contest the amount, or *quantum*. Any just law must, therefore, contain adequate provision for determining both questions.

The natural and obvious method of procedure is, first, to determine whether or no the right exists, because unless it does, the assessment of damages is entirely nugatory. I pass by, intentionally, the exceptional case where, in deciding on the *quantum*, the tribunal finds it to be *nil*; that is, that no damage has in fact been sustained. Such cases are so rare in practice, that their occasional occurrence ought not to influence the law in its general provisions.

In every case but these, if the right to compensation be denied on grounds ultimately held sustainable, any preceding assessment of compensation is entirely useless; and it seems, therefore, that the first care should be to provide that, on a claim of this nature being made, the promoters should be put in a position, if they please to deny in principle the right to compensation, to obtain a final decision on that point, and that this should be before any proceedings are taken, or expense incurred in determining the amount. If, on the claim being made, a formal intimation of the intention to dispute the right were given, the claimant should deliver a short statement setting forth the heads of claim, and showing how he founded his case; the Company should make a responsive allegation, and the matter be put in train for decision, on the points of law involved, before any further steps are taken. This, if an efficient tribunal were provided, ought not to involve any serious delay, and would

save the great expense attendant on the present unsatisfactory system, in which we reverse the process. I never could understand why this was so. In the ordinary case of an action, the judge always tells the jury to consider first whether the plaintiff is entitled to their verdict; because, if they find for the defendant, the question of damages never arises. How much more is this the obviously convenient course when the question of damages involves a separate inquiry, often accompanied by enormous expense and great trouble!

Assuming, then, proper provision be made enabling the promoters to test the legal right, the cardinal question arises—how is that right to be regulated; when is a person to be held entitled, and when not?

This is the chief difficulty in dealing with the subject—a difficulty which has, under the Lands Clauses Consolidation Acts, divided the judges in every one of the courts of Westminster Hall; has produced decisions by no means harmonious in the Courts of Appeal, and, in the House of Lords itself; has given rise to much doubt and embarrassment, attended by strong expressions of regret from one, at least, of the most learned jurists of modern times—I mean the late Lord WESTBURY.

To deal with the matter, the two cases—one where “land” (including in that word some right or easement thereon) is taken from the owner, the other where no land is taken by the promoters—must be kept steadily in view.

In the former case, where the soil, or some interest in it, is acquired under compulsory powers, the solution is more simple.

All damage resulting from the taking of that land or interest, and its use and appropriation to the purposes of the undertaking, ought clearly to be made good to the landowner.

This right should be conferred in terms which would

entitle the land-owner to be paid for damage to his occupation during construction of the works, as well as from their use in after time.

Supposing he were asked to sell, by private agreement, a piece of land abutting on what he intended to retain, and the avowed object of the purchase was to use the land as part of an undertaking, the creation and use of which damaged the residue left him, every prudent man would take care to be paid for it in the price accordingly, and he would not be fairly open to the imputation of making an unconscientious bargain.

Why, then, should the bargain which the law enables the promoters to force on him, against or without his assent, be less advantageous to him?

The only limitation I can see which ought, properly, to be made is this:—as in the case of purchase a fair and liberal *commercial* value is to be taken, and all considerations involving a *pretium affectionis* ignored, so here, when once the lawgiver arrives at the conclusion that it is for the general good that the rights of property should be abrogated to permit of the undertaking being carried out, an owner ought not to be allowed to say, “I will, because you take one square yard of my land put a prohibitory price on that, and if you take it make you pay for a damage which does not flow from your contemplated use of *that* land, but which, though resulting to me generally from your undertaking, is a loss I could not claim of you, but for your wanting my yard of land.” He ought not to be permitted to use this piece as a shield to ward off the undertaking altogether, unless such compensation were paid him.

If he could do so, then, on principle, the owner of the last plot of land acquired for a railway would be entitled to say, “It is indispensable for you, and I put a figure calculated not by its worth to me, but by its necessity to you.”

If the right test in acquiring land be the fair commercial value (with an allowance for compulsion being involved), surely the right test in measuring damage is that which fairly flows from the taking of the land acquired, that which is traceable to the taking of that piece and its use, and not the consideration that it is an integral part of what is essential for the scheme, without which the undertaking cannot be carried out, and require compensation to be made on that footing, either for the land or for the damage.

To take a case eminently suggestive,—that of a posting-house on an old coach road. If the premises be untouched, I assume that no claim for compensation arises, though the making of a railway near by completely destroys its value. If a square foot of an outhouse or stable of that inn be taken by the railway, leaving the premises, say £10 worse than they were before, is the loss of goodwill and the ruin of the business to be tacked on to this stable corner, so as to entitle the innholder to say, “Pay me for my entire business, because you take that angle?” This seems manifestly absurd.

Again, on a large estate, a keeper’s cottage has a rod of the garden taken by a railway, half a mile off the mansion—value of the land, say £10,—but the railway on other land in view of the mansion constructs a highly detrimental embankment, destroying the prospect. Is this loss to be deemed claimable merely by reason of the taking of the rod of garden from the keeper’s cottage? The absurdity in this case seems equally manifest.

After much consideration, I think the test must be that all such damage as necessarily, or in fair contemplation, can be deemed to result from the taking of that land ought to be paid; but that the taking of that piece of land ought not, so to speak, “to let in” the claimant to a right to compensation of a different class or nature from that directly

arising: the damage in respect of which the compensation arises must be necessarily referable to the taking of that land and its use, in conjunction with other lands, for the undertaking.

Within these limits as a qualification, I am unable to see why, in cases where land is taken, all resulting loss or damage should not be made good to the land-owner.

The hypothesis supposes land taken. Land includes houses, business premises, manufactories, and the like. Here may, perhaps, be mentioned the reinstatement theory, as it is sometimes termed; and for which the case of *BARTRUM* and others against the Corporation of the City of London is cited as an authority.

A man is turned out of business or residential premises; his occupation is just adapted to his wants; his trade could bear the rent, and the premises were suitable;—the house is exactly adapted to his requirements and his means.

When he goes, he must find other business premises or another residence. There is none which can be got or which can be built by him, except at an expenditure or outlay greater than the admitted value of his interest in those of which he is dispossessed. To pay him such value only, would leave him worse off than before, by reason of the taking of his old premises away. It appears to me, on all principles both of law and common sense, that he ought to be recouped the necessary *extra expenditure* and outlay up to this point, and that the recoupment must be limited by the total value of the business he moves, or of the house accommodation which will provide for his wants, and is procurable.

This doctrine, though obvious when thus stated, has given rise to misconception, depending mainly on losing sight of the fact, which is a postulate in the proposition, that no other place can be found except at an enhanced value

above the value of the old premises. BARTRUM & Co.'s trade value of the old premises *to them* was certainly what it would necessarily cost them to acquire new trade premises, unless, indeed, the trade were annihilated. The case would be, perhaps, plainer on the facts, but not differing in principle, if we suppose there were no premises at all to which a trader could remove, and he had to stop his trade till some could be built for him. It would be a legitimate head of compensation to pay him for his trade profits lost during this enforced cesser of his trading.

It will not fail to be observed that this doctrine does not infringe on the principle laid down that it is the *commercial value* which should regulate a sale under compulsory powers, and not fancied value to the claimant.

In the reinstatement case put, the true commercial value is the test acted upon, and there is, in adjusting the compensation on this principle, a weighing of the former against the new state of things in the only premises procurable, and a making good of the difference. This is truly what is meant by compensation, as the etymology of the word plainly indicates.

To resume, however. As has been already remarked, it is in cases where no land is taken that the greatest difficulty, in determining the principle on which a right to compensation shall be accorded, is found. One of two entirely distinct principles may be adopted—each has its advocates. By the former and more limited, the grant of the right to compensation is restricted to those cases where the land itself, or the claimant's interest in it, has been *injuriously* affected; the word "injuriously" meaning "*in an actionable sense*:" by the latter and more extensive, the right is deemed to accrue whenever there has been an injurious affecting, or damage in the popular, as distinguished from the legal, sense of the word.

To quote Lord WESTBURY's words in *Ricket v. The Metropolitan Railway Company* :—

“The true principle and the only rule is, that, in the inquiry whether the interest of the occupier of a messuage or building is damaged, that is, injuriously affected, you should estimate the value of the messuage or building to the occupier with reference to the use that he makes of it, and the beneficial purpose for which he has hired it and fitted it up, and for which he has paid and pays to the landlord a larger annual sum than the building *per se* would command; and if you find this use and enjoyment impaired by the works of the railway, you are bound to decide that the interest of the occupier is *pro tanto* damaged, that is, injuriously affected.”

By the former principle, the injury must be actual injury to the land itself—as by loosening the foundations of buildings thereon, obstructing its light or its drains, making access to it impossible or difficult, or by otherwise physically deteriorating it. Thus an embankment which obstructs the view, being constructed on the soil of another owner, gives no right to bring an action (for by our law no man has a property in a prospect except by express grant), and would create no case for compensation under the former principle, but would under the latter.

Which is the right one to adopt?

Those who advocate the larger view, urge that in conceding to the promoters their object in granting them the compulsory powers which are essential to the undertaking, it is only just that all damage in fact resulting from the exercise of the powers should be made good to those who suffer. Those who hold the other view, while admitting that some compensation must be given, allege that there must be some limits laid down, and that the only limits possible are where a legal injury begins.

They say, with truth, that the individual owners of the lands taken might, if they so pleased, unite to do all the acts authorized by the special Act; that if there were a common agreement between themselves, then all that happens under the Act would happen without it, in which event no claim could be maintained, as nothing unlawful, nothing founding a right of action, would occur; and consequently, as the sole need of these compulsory powers is to do that under them, with respect to the owners of property, which they could, by union among themselves, do, they and they alone are concerned: when they are compensated, all who are entitled to compensation are dealt with; and they urge that it would be anomalous to make the mere fact of the presence or absence of agreement among these land-owners confer the right of compensation, or not, on third persons.

In other words, that it would be inequitable to impose, as the condition of the grant of these powers, a liability to make compensation to those who could be injured in precisely the same way without remedy, if all the land-owners agreed.

It seems to me that this latter argument is the sounder. The vigorous reasoning of Lord WESTBURY seems to ignore the fact, that for many an injury of a real and substantial nature, by our law, no right of action arises. Loss alone does not give rise to a claim for damages, unless it be caused by the invasion of some legal right. Thus, the opening of a new thoroughfare may divert a stream of traffic from its old and accustomed channel—a stream, which so long as it flowed, conferred an essential element of value on the adjacent premises; and, when a new channel is opened, and the former drained, all trade values in the old route may be seriously and permanently depreciated. The opening a railway may almost entirely terminate the old road traffic,—as it did on the great high roads of the

country,—and yet no action could be brought. There must be, as it is technically styled, a *damnum cum injuriâ* to support a claim for legal redress. The same result happens when an old-established house, built for a particular trade and long enjoying a monopoly, is affected by a rival establishment set up in the immediate neighbourhood: the premises are left untouched, and yet are not only seriously, but permanently, depreciated in value. Suppose a fully licensed public-house, built for the trade, and a license granted to a newly erected house opposite. Yet no one ever dreamt of this being the subject matter of an action. Why, then, should lawful acts on the lands of others found a claim for compensation, merely because those others are a public body, either improving the locality for the good of the public, or with an element of trading gain underlying their undertaking. It is difficult to see why, in the one case, there should be compensation, and, in the other, no right to damages; or why the right should depend on how the land on which the undertaking is carried on was acquired from its former owners.

Further, admitting for the sake of argument the larger principle, where is the line to be drawn? Is it whether or no the tribunal charged to assess the *quantum* of damage shall find there was any or not? If so, it would confer on the tribunal the power of giving compensation in such cases as it pleased, and the corresponding power to withhold it; and the right would fluctuate with the decisions of the tribunal, rendering the law uncertain to the last degree. Or, if some limit were felt necessary, how is it to be laid down? The end of a street is cut off from access to a public navigable river, and a roadway on land substituted: are all the occupiers in the street to be entitled to compensation? The man two doors from the river may never have used the water; his neighbour further away may have had all his

goods brought by water : is the accident of the mode in which the particular man conducts his trade to be the test ? A large embankment may make wharf property scarce, and, therefore, dear, by absorbing half the wharf accommodation of a great city. Is every man whose business arrangements compel him to use wharfage to be entitled to compensation, by reason that owing to the diminished wharfage left, wharfage dues have been increased ; and if not, what radius or distance can be suggested where the right is to be deemed to begin, or where it is to be held not to accrue ?

All kinds of claims of a wide and indefinite character would arise—claims preferable only because other people's land was taken from them under compulsory powers, claims reducible to no principle, and opposed to the distinction, (well established by the common law,) of injury to a legal right being requisite to confer a right of action. This distinction experience shows is not arbitrary, but, on the whole, works for the benefit of the community at large.

On a review of the arguments, I am disposed to ignore the few cases of hardship which may arise, and adhere to the present established rule, that unless there be invasion of a legal right, no claim for compensation ought to be sanctioned by the law, and, as already pointed out, where the legal right is invaded by the taking of "land," I would limit the right of compensation to the damages directly and naturally flowing from the taking and use of the land, and would exclude those which in law would be held too remote.

The distinction taken of damage resulting from the undertaking when complete, and that occasioned by the proper user of the works when made, referred to by Lord WESTBURY seems sound. He says :—

"I agree also with the distinction that has been taken between damage resulting from the railway, when complete,

or from the act of making it, and damage occasioned by the proper (not negligent) user of the railway when made. No claim can be made for loss resulting from the due user of a railway."

It is difficult, however, to reconcile the adoption of this distinction with what is evidently the principle on which it proceeds, viz., that the injury must result in respect of the quality, not quantity, of the estate of the claimant, in order to vest the right; that is, unless it happens to him as owner or occupier of the land in his capacity as such, and by reason of his estate in the land, he has no claim, merely because he, happening to be owner or occupier, is damnified.

Having thus discussed the main principles on which I conceive the great subjects of purchase and compensation should depend, I now turn to the consideration of the Act itself. When the clauses of the Act pass in review, the suggestions I have to offer will naturally present themselves. It has been justly said of the prevalent tone of the English mind that though a practical, we are not a logical nation. A foreign jurist, if called on to frame a code of positive law on the subject before us, would probably commence by a series of mathematically neat definitions, enunciating the principles to regulate all purchases and compensations. The framer of "The Lands Clauses Consolidation Act, 1845," did not so proceed. The statute deals with few principles, and those chiefly in an incidental manner, subordinating them to an elaborate system of procedure; and the extracting of principles from which is often a labour of extreme difficulty, even to the highest trained minds in the country. Witness what Lord WESTBURY says on this matter:—

"My Lords, this case was heard by six judges in the Court of Exchequer Chamber, on a writ of error from the Court of Queen's Bench. The six judges differed in opinion, four being for reversing and two for affirming the

judgment of the court below. The four judges in the Queen's Bench were unanimous. Deducting, therefore, the two from the six judges in the Exchequer Chamber, the unanimous judgment of the four judges in the Queen's Bench has been annulled by four judges in the Exchequer Chamber. By the same majority the case of *Senior v. The Metropolitan Railway Company* (1) decided by the Court of Exchequer in 1863, and the case of *Cameron v. The Charing Cross Railway Company* (2) decided by the Court of Common Pleas in 1864 (which are the authorities for the judgment in the Court of Queen's Bench in the present case), have also been overruled. There are, therefore, the judicial opinions of ten or twelve judges opposed to the present judgment, which is the judicial opinion of four.

"It is a matter of regret that our judicial institutions should admit of these anomalies. It is also painful to observe the number of conflicting decisions on the law of compensation by railway companies, which is the subject of the present appeal. It is impossible to reconcile these decisions by any sound distinctions, and the result is that, to a great extent, they neutralise each other. Moreover, it is distressing to be told (as we are in the judgment before us) that the Court of Exchequer, in *Senior v. The Metropolitan Railway Company*, and the Court of Common Pleas, in *Cameron v. The Charing Cross Railway Company*, founded their judgments on the supposed effect of the judgment given by the Court of Exchequer Chamber, so recently as in the year 1863, in the case of *Chamberlain v. The London and Crystal Palace Railway Company* (3), but that both the Common Pleas and the Court of Exchequer did not understand the judgment on which they so relied. It is a striking example of the uncertainty of the law which rests on judicial decisions."

I would add, it is a striking instance of the uncertainty,

anxiety, and trouble, to say nothing of the delay and expense, entailed by the Legislature not explicitly saying, in simple concise language, what was intended.

The Act of 1845 is divided into several series of clauses commencing with separate headings, thus making *fasciculi* of clauses, as styled by a learned law lord. Its first section incorporates it with every undertaking which authorizes the purchase or taking of lands, and provides that its several enactments shall be deemed as part of those of the special Act; hence, a canon of construction is incidentally given. If the special Act be for the making of a railway, then these clauses must be construed as subordinated to that declared object, viz., a railway. If for gasworks, then for that purpose, and so of waterworks and other undertakings. The main purpose of the Act—namely, railways, gas or waterworks—must be looked at; be taken to be the end of the legislation, and the various provisions thus incorporated must be regarded with respect to the paramount object authorized.

The first group of sections (commencing with 6) relates to the purchase of lands by agreement. That section enables all persons having any estate or interest in the lands authorized to be taken and required, for the purposes of this Act, to sell them; and as many owners are incapacitated from selling their lands, by reason of various kinds of disability, section 7 proceeds to empower such — especially corporations, tenants for life, or in tail, married women, doweresses, guardians, commissioners of lunatics or idiots, trustees and feoffees, executors and administrators, and all persons at the time entitled to the receipt of the rents—to sell; with a provision that this power may be exercised (except by doweresses and lessees for lives or less), so as to bind all persons entitled in reversion, remainder, expectancy or otherwise. Powers to sell, in consideration of a

rent-charge, secured on the tolls payable to the Company, with powers of distress, follow ; as also powers to the promoters to sell lands acquired for existing purposes, and purchase others in lieu thereof. This latter right is not to be exercised (sec. 14) against a land-owner under disability. All purchases from municipal corporations are subject to the approval of three of the Lords of the Treasury.

The next heading is as to the purchase of lands otherwise than by agreement.

After providing for the better security of land-owners, that all the capital shall have been subscribed before any compulsory powers are put in force (which fact is to be evidenced by a certificate signed by two justices), section 18 enables the promoters to give to all persons interested in the lands they are authorized to take, the notice so familiarly known in practice as a "Notice to Treat."

This notice must specify the particulars of the lands required, and that the promoters are willing to treat for the purchase thereof, and as to the compensation to be made to all parties for the damage that may be sustained by them by reason of the execution of the works.

Here is a statement, by implication certainly, that the Company shall in all cases pay such damage, otherwise their expressed willingness to treat would be unmeaning. It is curious to observe that the draftsman refrained from saying, in direct terms, that the Company shall pay all parties for the damage they may sustain, and leaves it thus to come in by a side wind.

In practice, the addition of a plan showing the land to which the notice applies, is general ; it ought to be universal, on account of its convenience. The 19th and 20th sections relate to the service of notices, on which I need only remark that the same machinery permitting service by registered letter, as in the case of claims and objections to

Parliamentary votes, might be well allowed both upon the Company and the land-owner.

Sec. 21 is important. It provides that if no reply be made to the notice, or if no agreement be come to within 21 days after service, as to the amount of compensation for the party's interest in the lands and for any damage he may sustain (using like words to sec. 18), then the amount shall be settled as in the case of disputed compensation.

Sec. 22 deals with cases where purchase-money and damage as claimed do not together exceed £50, and remits such claims to the settlement of two justices.

Sec. 23 entitles the party claiming above £50, to exercise his option of having the amount settled by arbitration, providing that in default thereof, or of the arbitrators or umpire making their award in due time (3 months), or if the award is not final, that the verdict of a jury must then settle the question.

These provisions appear susceptible of some improvement, but I will defer my suggestions till I deal with the whole subject of arbitrations.

The 24th section prescribes the mode of procedure before justices, which is by summons, the due service of which having taken place, complete jurisdiction to hear and determine arises, and the costs are left to their discretion, both as to right to and amount allowed for them.

The provisions for the disposal of cases before justices, where the claim does not exceed £50, seem to be fair to both sides; but it is remarkable that they establish the power of the tribunal to proceed in the absence of either party on proof of the due service of the summons, and give complete discretion over the costs, which, in cases under £50, often bear a very large per-centage to the amount claimed. Why another rule should be applied in cases involving larger amount, seems difficult to conjecture.

It has been thought by some that justices are not the best tribunal to deal with these cases and that, especially in the metropolis, the police magistrates have too many other duties imposed on them. In country districts two gentlemen of position and intelligence are secured; and in London those who have had experience will, I think, bear me out in stating that the awards of the magistrates are not open to any reasonable complaint.

Bearing in mind that, in these small claims, promptness in settlement is a chief consideration, I do not think that the Act needs reforming in this respect.

The 25th to the 37th sections, inclusive, deal with arbitrations, umpirage, and awards. The general scheme is to entitle either party, unless a single arbitrator be agreed on, to appoint one to act on his behalf, and, by giving notice thereof to the other side, to call on them to make a like appointment on their behalf; on failure to make this latter appointment, the party so requesting the other, may name his arbitrator to act for both.

The 26th section enables a vacancy, caused by death, or by any arbitrator becoming incapable, to be supplied by a fresh appointment. It is odd that this section does not provide for the case of an arbitrator refusing to act.

The arbitrators selected (if two) are to appoint an umpire; but if they do not concur in naming one, the Board of Trade in railway cases, two justices, in any other case (in London, a police magistrate), are to make the appointment.

To this objection may fairly be taken. Why should not justices, if they possess sufficient knowledge to choose, properly appoint in all cases; or why should a railway company be specially privileged? The difference seems based on no real principle.

Sec. 30, which enacts that if any arbitrator refuse to

act, the arbitrator named by the other side shall proceed *ex parte*, seems unfair. Either party may appoint, as arbitrator, a person who refuses to act; if so, there should be liberty to make a fresh appointment, and if this were to be limited to one exercise of the power, sufficient security against an illusory appointment would exist, and all risk of injustice be obviated.

Sec. 31 remits the case to the umpire, if for 21 days the arbitrators fail to agree. This seems a very short time, looking to the intricacy of many cases and the large sums involved. The powers to arbitrators or umpire to call for books and papers and examine witnesses, are given by sec. 32; but in all cases, both before juries and arbitrators, there ought to be a power to compel the production of deeds, agreements, and evidences of title a reasonable time before the hearing; to inspect the premises with witnesses; to take stock and examine books and invoices, where the claim refers to such items.

Sec. 33 compels the arbitrators and umpire to make a statutory declaration that they will act faithfully and honestly, and renders a wilful breach of such declaration a misdemeanour.

I would abolish this formal declaration. It savours of pure formality to require it as a condition precedent to an otherwise good award. Serious injustice has been done, within my knowledge, by this useless condition being rigidly enforced.

Sec. 34 provides that the costs of the arbitration shall, in all cases, be borne by the promoters, unless the award is of, at least, as small a sum as previously offered by the promoters, when each party is to pay his own costs, and the costs of the arbitrators are divided between them.

It also made the arbitrators tax the costs,—a work, except, perhaps, as to surveyor's fees, evidently more fit to be done by

a taxing officer, used to such matters. This latter provision the Act of 1869 has remedied, though in a clumsy way. It provides that the masters of the Superior Courts of Common Law shall tax these costs. The Court of Queen's Bench had previously held, under the section relating to the costs of jury procedure, which by the Act of 1845 are to be taxed by one of the masters of the Queen's Bench, that the master performed this duty as *persona designata*, not as officer of the court, and, consequently, that his taxation was not liable to review, or within the control of the court, as other taxations are. When amending the Act, the Legislature might as well have put the matter on a sensible footing, by making all the masters of all the courts tax the costs of jury and arbitration proceedings alike, and that in their capacity of masters, with a liability to review, as in other cases.

Why Queen's Bench masters alone should tax jury costs, and they, with Common Pleas and Exchequer masters be enabled to tax arbitration costs, is apparently of the class of inscrutable mysteries.

But the real objection to this section is that, as the costs are not left to the arbitrators' discretion, no power exists by which the promoters can get at the true facts in time to enable them to judge what is a proper offer to make, and yet they must make one under peril of paying all the costs.

I am at a loss to see why a claimant who establishes a right to no more by his proceedings than he might have had without them, should not pay the penalty which every unsuccessful litigant bears. Why should he be entitled to compel the Company to pay their own costs in any event of a litigation in which they are in the right, and he altogether wrong? This is a direct premium to an unscrupulous claimant.

The award being a necessary step in the sale, *i.e.*, that

part of the transaction which fixes the price of the land taken, belongs to the promoters, who must take it up, and by sec. 35 deliver a copy to the claimant.

Secs. 36 and 37 are on formal matters merely.

Pausing here for a moment, I may observe that these arbitration clauses are behind the more modern ones embodied in "The Common Law Procedure Act, 1854;" they are less workable, and contain several serious defects. There is no power to enlarge the arbitrators' or umpire's time but by consent—a consent sometimes withheld merely to create delay and embarrassment.

It is clear that the power to enlarge should exist. It would never be exercised by any judge to occasion wanton delay; and if this be prevented, no tenable objection can be made to it. There are minor suggestions which occur; but I pass on to consider the jury provisions, reserving, till later, some extremely important points applicable as well to jury as to arbitration inquiries.

As to jury procedure, there is no separate heading in the Act; but the 39th section provides that the promoters shall issue their warrant to the sheriff to summon a jury under their seal, with power to appoint an assessor in the discretion of the sheriff.

The coroner is to act as the sheriff, in cases where the latter is interested.

Twenty-four jurymen are to be summoned, at a place appointed by the sheriff, not less than 14 or more than 21 days after the warrant is received by him; and he is to give notice of the time and place of holding the inquiry to the promoters forthwith.

The 42nd section provides for the empannelling of the jury, and for a tales of bystanders if sufficient jurymen cannot otherwise be found; the sheriff to preside. The trial is to take place as if at *nisi prius*, the claimant being deemed

plaintiff. Power is given to summon witnesses and order a view of the *locus in quo*.

Secs. 44 and 45 impose penalties on defaulting sheriffs, jurors, and witnesses respectively.

Sec. 46 enacts that the promoters shall give at least 10 days' notice of the time and place of the inquiry to the other party. This is important to note, as, within this time, any formal offer of the promoters, so as to prevent future liability to costs, must be made.

Sec. 47 is peculiar. It provides that if the claimant who has had this notice, fail to appear, the proceedings shall lapse, and a surveyor, to be named by two justices, shall assess the compensation. Why, if the claimant has demanded a jury, and put all to the inconvenience of coming, and the promoters to the costs, is he to be at liberty to absent himself and subject them to this useless expenditure? At least all costs incurred should be deducted as a first charge from any compensation he may ultimately be awarded; but I cannot see why, in any case where he has asked for a jury, the case should not be disposed of *ex parte*, unless he has given a notice, in fair time, to prevent the jury being summoned.

To prevent any advantage being taken of a claimant who is not ready to try his case, I would give full powers to a judge to adjourn the sheriff's appointment for the hearing for any time not exceeding say 30 days; this power to be exercised on summons by order in the usual way. With this safeguard, sec. 47 might well be altered as suggested. Sec. 48 merely empowers and requires jurymen and witnesses to be sworn by the sheriff.

Sec. 49 is an important section in the Act. It in direct terms provides only that where purchase-money and compensation are both claimed, the jury shall, in their verdict, sever the sum to be paid for the purchase of the land from

that given, by way of compensation, for the damage to be sustained by reason of the severing of the lands taken from the other lands of the owner, or otherwise injuriously affecting the last-mentioned lands, by the exercise of the powers of the Act.

The reason for this separation is, probably, that the *ad valorem* stamp duty on the purchase-money may be calculated ; but, incidentally, the section expressly recognises the right of the owner of the land, not only to be paid for the land itself but for all severance and other damage caused by the execution of the Act.

It is to be regretted that the words “injuriously affecting” were not defined by the Act so as to relieve the courts of the necessity of discovering whether every depreciation in fact was intended to be included or only such as followed upon the invasion of a legal right.

The decision of the ‘highest tribunal of the land has, in Ricket’s case, declared the latter to be the true view. In the Common Pleas, (in the more recent case of *Beckett v. The Midland Railway Company*, reported in Vol. III., *Law Reports (Common Pleas)*, p. 94,) the law is thus compendiously stated by the late Mr. Justice WILLES :—

“I am of the same opinion. Whatever difficulties may have arisen in other cases, this appears to me to be a perfectly plain one. To entitle a claimant to compensation under ‘The Lands Clauses Consolidation Act, 1845,’ two things must concur, viz., that he has sustained a particular damage from the execution by the Company of the works authorized by the special Act, and that the damage was one for which he might have maintained an action if the work was not authorized by Parliament. To these propositions everybody will now assent, notwithstanding some observations of the very able and learned lords in *Ricket v. Metropolitan Railway Company* which would seem to throw some

doubt upon the latter of them. Then there is a third point which, looking to the language of the Acts of Parliament, it is obvious that the claimant must establish, viz., that the injury he complains of, was an injury to his estate, and not a mere obstruction or inconvenience to him, personally, or to his trade, although it might have been the subject of an action if the works which occasioned it had not been executed under the sanction of Parliament. To these propositions the judgment of the House of Lords in the case last referred to has added another, which must be taken to be equally clear, and which we are bound to assent to and to act upon, and one which I cheerfully accept upon such high authority, and upon which I shall act to the best of my ability; and that is, that the damage complained of must be one which is sustained in respect of the ownership of the property,— in respect of the property itself, and not in respect of any particular use to which it may from time to time be put: in other words, it must, as I read that judgment, be a damage which would be sustained by any person who was the owner, to whatever use he might think proper to put the property. Now that, of course, is to be taken with the limitation that a person who owns a house is not to be expected to pull it down in order to use the land for agricultural purposes. That would be pushing the judgment in *Ricket v. Metropolitan Railway Company* (1) to an absurd extent. The property is to be taken in *statu quo*, and to be considered with reference to the use to which any owner might put it in its then condition, that is, as a house.”

This authoritative exposition of the law, though the cases arose under the 68th section, yet is applicable to the 49th; for the words used in each are identical. And, as already argued, no greater right can arise because land is

taken than to the damages flowing in a direct and ordinary sense from such taking.

The scope of compensation is to make good a loss sustained,—to equalize the balance. It is manifest, therefore, that the *status quo antè* must be contrasted with the condition of things after the powers of the Act have been put into execution and the difference, when ascertained, made good. In determining if there be a loss, it is clearly necessary to take into account how far the premises of the claimant will be *specially* benefited by the works. I say specially, because general benefit to the neighbourhood is not to be reckoned to the Company's credit any more than an injury sustained by the claimant as one of the public, ought to be reckoned to their debit.

From this is apparent the need of keeping all questions of purchase-money distinct from those of compensation. In arriving at the former, no set off or account of special benefits to the residue of the estate can enter into the calculation. It is only where compensation for damage is claimed that the benefit specially given to the property by the works can be regarded.

Thus it may well happen that land is taken, and must justly be paid for, when, in effect, the residue of the property is, after the loss of the land taken, and the construction of the works, worth more than the whole estate was before the Act was passed.

It manifestly follows that if loss sustained as a member of the public be excluded as a head for compensation, so benefit conferred on the public at large, including the claimant, must be ignored on the other side.

The 50th section provides that judgment is to be given on the verdict, and verdicts and judgments are to be deemed records. This means, merely, that they are to be proved

and treated as of the nature of judicial acts ; not that they are judgments on which execution can be issued.

The 51st section deals with costs of jury cases, substantially on the same principles as the 34th dealt with those of arbitrations, to my remarks on which, I would add, that the costs ought to follow the event, as the verdict is greater or not than the offer, making the claimant pay the Company's costs if the jury, in effect, decide the contention on his part was unfounded, and the offer sufficient.

Sec. 52 (still unamended) only admits of Queen's Bench masters taxing costs in jury cases—a singular limitation, now that the masters of all the courts may tax them in arbitrations.

Under sec. 53, a power (seldom used) to enforce payment of the costs by distress is enforced. The following sections enable either party to secure a special jury and make provision for summoning them, for talesmen and other matters relating to the jury.

The next subject dealt with is the case of absent owners or those who do not appear at the inquiry. Compensation to these is to be ascertained by valuation of a surveyor, appointed by justices, under certain restrictions embodied in secs. 58 to 67 inclusive.

Sec. 63 is very important. It will be remembered that sec. 49 only incidentally recognises the right to compensation for severance and damage caused by injuriously affecting, by saying the jury shall sever the amounts awarded under these heads from purchase-money. Sec. 63, in terms, says that the justices (in cases under £50), the arbitrators (in cases referred to arbitration), and the surveyors (in cases of parties who cannot be found) shall estimate, not only the value of the land to be taken, but also the damage by reason of severance from other lands of the same owner, or otherwise

injuriously affecting such other lands, by the exercise of the powers of the Act.

This is one of those sections in the Act where a right to compensation is conferred in direct terms.

The 64th to 67th sections make provision enabling the owner, where a surveyor shall have determined the compensation, to have an arbitration (conducted in the same way as other arbitrations under the Act), to determine whether the amount of the surveyor's valuation (which I ought to have stated is to be paid into the bank) was sufficient.

The costs of this arbitration, if the sum was sufficient, are to be in the discretion of the arbitrators; otherwise, to be borne by the promoters.

The 68th section contains one of the most generally useful clauses in the Act. Its provisions are so important that they merit quoting in full :—

“ If any party shall be entitled to any compensation in respect of any lands, or of any interest therein, which shall have been taken for or injuriously affected by the execution of the works, and for which the promoters of the undertaking shall not have made satisfaction, under the provisions of this or the special Act, or any Act incorporated therewith, and if the compensation claimed in such case shall exceed the sum of fifty pounds, such party may have the same settled either by arbitration or by the verdict of a jury as he shall think fit; and if such party desire to have the same settled by arbitration, it shall be lawful for him to give notice in writing to the promoters of the undertaking of such his desire, stating in such notice the nature of the interest in such lands in respect of which he claims compensation, and the amount of the compensation so claimed therein; and unless the promoters of the undertaking be willing to pay the amount of compensation so

claimed, and shall enter into a written agreement for that purpose within twenty-one days after the receipt of any such notice from any party so entitled, the same shall be settled by arbitration in the manner herein provided; or if the party so entitled as aforesaid desire to have such question of compensation settled by jury, it shall be lawful for him to give notice in writing of such his desire to the promoters of the undertaking, stating such particulars as aforesaid, and unless the promoters of the undertaking be willing to pay the amount of compensation so claimed, and enter into a written agreement for that purpose, they shall, within twenty-one days after the receipt of such notice, issue their warrant to the sheriff to summon a jury for settling the same in the manner herein provided, and in default thereof they shall be liable to pay to the party so entitled as aforesaid the amount of compensation so claimed; and the same may be recovered by him, with costs, by action in any of the superior courts."

It will be seen that this section embraces the cases of all interests actually taken and not compensated for by the promoters, whether notice to treat has or has not been given; it likewise covers all cases where an injurious affecting is alleged, whether land be taken or not.

Its terms apply to all cases of land taken or injury done, where satisfaction has not been made. So far as this satisfaction consists of purchase-money for land or an interest therein actually taken, no difference, in the principle of ascertaining the amount thereof, can be suggested from the procedure in other cases. So far as it regards compensation for injuriously affecting lands, the principles already stated in the judgments quoted, have been applied to cases falling under this section.

The considerations on which the right to compensation must depend have been examined in the earlier portion of

this Paper; and the 68th section, as expounded by the judges of the land, has also occupied our attention.

The machinery provided, alone remains to call for remark. A notice or claim, whether under this section or not, may be delivered, demanding one lump sum of money, not distinguishing between purchase-money and compensation. This ought not to be, because the promoters should have materials to enable them to make a fair and adequate offer; they ought, therefore, to have short particulars, showing the amounts claimed under each head. Such particulars, briefly showing how the claim arose, ought, in every instance, to be delivered; the promoters should be at liberty, if they deny the right to compensation, to deliver a counter statement, and the questions of law arising should be argued and determined before the *quantum* of purchase-money or compensation is assessed.

The court should lay down, in its judgment, the rules to be applied by the jury or arbitrators who are to dispose of the case, or, in proper cases, be enabled to order the assessment to be made, and the facts inquired into, before it finally disposes of the case.

This would proceed on the plain principle of establishing the right first, and of ascertaining its extent afterwards.

One great and main failing in the Act is the impossibility of rectifying any injustice, however gross, unless there has been some excess of jurisdiction; and, even then, to prove the excess is, in jury cases, difficult, in arbitrations nearly impossible. The procedure by *certiorari*, to remove an inquisition and quash it, is tedious, troublesome, and costly; and when an award is contested in an action, the technicalities are most embarrassing. To prove what are the claims presented before an arbitrator is not always easy; to show on what he adjudicated is well nigh impossible. The Act contains no power enabling an arbitrator to

state a special case for the opinion of the court, not even by consent of parties ; and, when one sees in practice that, to avoid the troublesome procedure applicable to these cases, counsel almost always agree upon a special case, it will be clear how desirable such a power would be to arbitrators or umpires.

Again, before these gentlemen, nice questions of law and of evidence often arise, requiring the aid of an assessor. They should have power to appoint one in all cases, if they so desire.

But there ought to exist the same remedy, applicable both to awards and verdicts, to redress error as exists in the commonest action at law, where the judge has mistaken the law or the jury have failed to apply it to the evidence. Provisions for granting new trials should be made in such cases, and, where the court is convinced that substantial injustice has been done, it should have power to order the assessment to be taken *de novo*.

This leads me to consider the question of a court. Able and painstaking as our judges are, with their many duties, it is not to be expected they should have that familiarity with this subject of the law which constant practice engenders. That the interests involved are, in amount, large enough to justify the creation of a special court, we know from experience ; that the questions demanding solution are difficult enough to require the application of the highest judicial talents we know from the great authorities to which I have referred. Why not, therefore, create a court which should be presided over by a judge, ranking with the other judges, and which should be subject to an appeal to the High Court of Appeal created by the Judicature Act of last year ?

Let this court be charged with the duty of disposing of all cases arising under the Lands Clauses Consolidation Acts, and of regulating the procedure before itself. The

funds necessary for the formation of such a court would be easily obtainable, by providing that all public bodies exercising compulsory powers should pay a certain per-centage, either on their land estimate, or on the extent of purchase or compensation money awarded under the exercise of their powers. I firmly believe the result would show that this would be well spent, and, probably, well saved money.

But I proceed. A series of sections as to the application of moneys coming to persons with limited interests, follows. If £200 or upwards, it must be paid into the bank; if under £20, to the parties themselves; if between £20 and £200, then either into the bank or to trustees for those beneficially entitled. The Court of Chancery has power to grant to life tenants or, to those with qualified interests, out of the moneys paid in, a sum to compensate them for their personal injury, inconvenience, or annoyance, independently of the money representing the value of the lands, or the damage occasioned by severance or by making the works. This sec. 73 is important, as showing that the Legislature knew how to express itself concerning such items, and that the refraining from mentioning them elsewhere is intentional.

I do not dwell on the more purely conveyancing portions of the Act, as they are hardly suited to a general discussion. The next material clauses are secs. 84 and 85, under which entry is permitted on lands before the purchase-money or compensation be assessed, on a bond being given for such amount as may be awarded finally, and a deposit being made in the bank in the meantime of such sum as an able practical surveyor, to be appointed by justices, may determine shall be the value of such lands. It will be noticed that his duty is simply to value the lands; severance and all other damage he is not to deal with, and, indeed, he is armed with no proper powers to investigate such matters. He is simply to look at the land taken, and determine the value accordingly.

After providing for what is to become of the moneys deposited; after subjecting promoters who enter on lands without complying with the terms of the Act to penalties; and enabling justices to give possession to the proprietors of lands improperly withheld, the 92nd section protects owners from being required to sell a part only of a house or other building or manufactory, if able and willing to sell the whole.

This provision is reasonable and just. Though it has occasioned much litigation as to what is a house or other building or manufactory, the courts are disposed to put a popular, as opposed to an artificial legal, sense on them.

Sec. 93 enables land-owners, in cases where severed lands, in the country, are less than half-an-acre statute measure, to require the promoters to purchase the same, unless other lands of the same owner adjoin, to which they can be conveniently thrown; in which case, by notice, the promoters shall throw them into the adjoining lands so as to be occupied therewith.

Also by sec. 94, where the expense of obtaining access, by bridge or otherwise, exceeds the value of the land, the owner may require the promoters to purchase it.

On the provisions regarding copyhold, waste and common lands, I will not dwell, except to say that the former must be enfranchised, which involves payment to the lord for his mineral rights, *inter alia*, in all cases. The promoters have power to redeem mortgages; but if the lands be charged to more than their value, on ascertainment and payment of the true value, the mortgagee must convey to the promoters, free of the mortgage.

Enactments of a somewhat elaborate nature as to the apportionment of mortgage debts and the like, where part only of the mortgaged lands are taken, follow, as do like provisions in the case of leaseholds, by sec. 119. Sec. 120 gives a lessee, part of whose holding is taken, compensation

for severance and other damage, by reason of the execution of the works in direct terms.

Sec. 121 gives tenants from year to year, or for a lesser interest, a right to compensation, "if required to give up possession before the expiration of his interest therein,"—not otherwise,—

1st. His unexpired term ;

2nd. Any just allowance which would be made him by an incoming tenant ;

3rd. Any loss or injury he may sustain ;

with an addition for severance if all his holding is not taken. The compensation in these cases is to be settled, summarily, before justices ; and this is, probably, the best way of dealing with such limited interests.

Sec. 122 enables the promoters, where a greater interest than from year to year is claimed by a lessee, to demand inspection of the lease or grant ; and, in default of production, within 21 days, he is to be held as yearly tenant only, and compensated accordingly. This section should extend to all claims. The promoters should be entitled to have inspection, before the compensation is assessed, of all deeds of title.

The chief remaining provisions relate—

I. To lands omitted to be purchased by mistake. These the promoters are empowered to buy, paying full compensation for mesne profits or interest ; thus, as far as may be, putting the transaction on the footing of having been carried out at the proper time.

The value of such lands is to be estimated as at the time of the promoters' entry, and irrespective of their works or improvements.

II. To the sale of superfluous lands, in which the adjoining owners, rightly, are to have the first offer, at a price to be fixed by arbitration.

III. Poors rates and land tax are to be paid by the

promoters on lands taken by them, at rates calculated to make good the deficiency to the parish or Crown, by reason of such lands having been taken for the works, until they be completed and assessed to such rates or tax.

Some provisions as to procedure, penalties, and forfeiture close the Act of 1845.

The Act of 1860 extended the powers to sell in consideration of a rent-charge to persons under disability, and applied all the powers of the Act to the Secretary of State for the War Department for the purchase of lands wanted for the service of the Admiralty, the War Department, or the defence of the realm.

The Act of 1869, besides the question of the taxation of costs, already dealt with, puts the high bailiff of Westminster in the position of the sheriff under the Act, within his city.

I have thus brought a lengthy and, I fear, tiresome examination of the statute to an end. As we went along, I ventured to offer some suggestions for its improvement which had occurred to me; but in submitting them to the judgment of those who are practically acquainted with the working of the Act, I would remark that, in spite of some defects, the Act, now tested by nearly 30 years' operation, has worked with tolerable smoothness; that property to the value of millions has changed ownership under its provisions; that compensation for damages to a very large amount has been paid, and that no general sense of injustice or unfairness in the system prevails in the public mind.

I trust, therefore, that, while suggesting these amendments, I may not be deemed presumptuous in expressing the hope that the main principles of the Act may be preserved, in consideration of their practical utility and tried worth.

MR. F. J. CLARK (Member) begged to propose a vote of thanks to the author of the Paper. The subject could not, he thought, have fallen into abler hands than Mr. PHILBRICK'S. Few men had given greater attention to these Acts, or had enjoyed a more extensive experience in their practical working, and the results of that experience had been very ably placed before the Society in the Paper just read.

MR. E. RYDE (Member) said that he had much pleasure in seconding the vote of thanks. Mr. PHILBRICK had treated his subject with the ability expected of him by all who knew him. He entirely concurred with all that Mr. CLARK had said, and thought, with a view to the due consideration of the Paper, that the discussion should be adjourned till the next Meeting. Some alterations in the existing law, of a very important kind, were suggested by the author; and, although he did not wish to anticipate the regular discussion, he might just venture to remark—by way of clearing the road—that Mr. PHILBRICK, if he rightly understood him, suggested, in the first place, that the law should be so amended as to give an opportunity of testing the right to compensation before proceeding to determine the amount of that compensation. To that suggestion, or to any such amendment, he (Mr. RYDE) saw the gravest objections. He thought that whatever was done with the Lands Clauses Consolidation Act, (whether in the interests of Companies or of individual claimants,) no changes should be introduced which might have, or might appear to have, the effect of increasing the difficulties with which claimants have to contend. If the law were amended in the direction suggested, it would give to Companies who were not prepared to pay the money at the moment, or who did not care to proceed with the case, an opportunity for delay, of which

some would not be slow to avail themselves, thus not only increasing the difficulties which a claimant often had to contend, but also adding very much to those of professional men who acted for Companies in compensation cases. He merely threw out this observation, that the attention of Members might be directed to the point as one which should be very carefully considered in the coming discussion.

Another important suggestion made by Mr. PHILBRICK was the desirability of establishing a Court of Appeal. Now, no doubt it was desirable, as an abstract proposition, that mistakes should be corrected ; but, speaking practically, he very much doubted whether, in reality, many mistakes were made in the settlement of cases, or whether either side got much more or much less than their due. The grave objection to a Court of Appeal was that litigation would be endless. A claimant or a Company not liking the decision of an arbitrator or the verdict of a jury would appeal, and the result would often be an accumulation of costs which would ruin claimants of small means.

There was one respect, however, in which some amendment might be made in the Act of 1869,—in the clauses which dealt with costs. He was of opinion that those clauses did no one any good, and that their operation was often very injurious, especially to the interests of Companies ; for he believed that arbitrators, taking a broad view of the cases submitted to them, and not being bound to state their reasons in making awards, were accustomed not to overlook the fact that a certain proportion of the costs to which claimants were ordinarily put were not recoverable from the Company, and make allowance for it as forming a part of the injury which they sustained. He would reserve any further remarks until a future occasion.

The Meeting then adjourned.

AT
THE ORDINARY GENERAL MEETING,

Held on Monday, January 19th, 1874,

THE PRESIDENT IN THE CHAIR.

The discussion on the Paper by Mr. F. A. PHILBRICK, entitled "The Lands Clauses Consolidation Acts, with some suggestions for their amendment" was resumed by

Mr. E. RYDE (Member), who said that the Paper which the Members had that night met to consider presented so many points for discussion in almost every paragraph, that his chief difficulty in speaking upon it, lay in the task of determining what to select as the subject of his observations.

He would begin with the remark with which Mr. PHILBRICK concluded his Paper, viz.,—"I trust I may not be deemed presumptuous in expressing the hope that the main principles of the Act may be preserved, in consideration of their practical utility and tried worth." He would express a strong hope that the Act would be very little interfered with. Like the well-known Rating Act of Elizabeth, which had come down to the present day almost unaltered, it was one of great practical utility, and would, he believed, go down to future generations, with its main provisions preserved, and bear evidence of the extraordinary and valuable work achieved during the lifetime of the present generation. All, therefore, which he proposed to do was to comment, as briefly as possible, upon some of

the principal features of the Act in connection with Mr. PHILBRICK's Paper.

He would, in the first place, refer to the third paragraph of the Paper, where Mr. PHILBRICK remarked that "by the common law of the land no subject can be compelled to part with his property to any other subject, whether it be to a private individual or to a corporate body of any of the kinds of Corporations having legal existence." The first individual, he believed, to whom compulsory powers for the purchase of land and other property had ever been granted, was the Baroness BURDETT COURTS, in connection with Columbia Market.

Compulsory powers for taking land, &c., were said to have been exercised within the last 50 years only; but he thought that the limit might be practically contracted to the last 30 years (excluding only a few instances of an earlier exercise of such powers)—the period which included the introduction of railways, the great undertakings for providing the country with its gas and water supply, and the principal metropolitan improvements.

The New River Company's Act of 1605, as quoted by Mr. PHILBRICK, provided that the persons who sustained any damage by reason of the undertaking were to be compensated "to their contentment." On that he would remark that, in these degenerate days, the attempt to compensate a man "to his contentment" would be to engage, he feared, in a hopeless task.

The tribunal which, in those primitive times, was appointed to assess the compensations, was a body of Commissioners,—not a jury brought together at random, and without any special qualification for the work. It was left to their practical good sense to do what they thought fair in each particular case; and that course of procedure, so far as history recorded its results, seemed to have been perfectly

satisfactory. The author of the Paper—alluding to the Act of the 15th Charles II. for the drainage of the Bedford Level—had observed, as analogous to the Sewers' Act, that it contained matters of great collateral interest, viz., how lands created or benefited by a public work, undertaken by a body of adventurers, should be made to contribute to the cost thereof. He (Mr. RYDE) had always been of opinion that a measure should some day be passed, by which railways actually required should be provided, by making land undoubtedly benefited, contribute towards the expense of carrying out the work.

In discussing the Lands Clauses Act, Mr. PHILBRICK referred to the fact that there were clauses which made provision for the acquisition of lands by agreement. Now the word "agreement" must not be taken in its ordinary sense. It simply meant the settlement of the price of the land, and the amount of compensation by agreement; for the fact must not be lost sight of, that a railway carried through a country was a work of compulsion, even though the price of the land were settled by agreement. It did not at all follow that the land-owner was a consenting party to the undertaking itself; and meant nothing more than this—that the land-owner agreed to take a certain sum for the land with which he was compelled to part, rather than run the risk of an arbitration or a jury assessment of its value.

As he said before, he believed that the main provisions of the Act had worked well, and that fair compensation for any real and tangible injury was readily obtained under its operation. Any interference with the Act would probably do more harm than good.

The author had given several illustrations of the manner in which property might be injuriously affected by severance, and in other ways,—such as (1) interference with its drainage

system ; deprivation of surface or underground water ; the construction of an unsightly embankment ; the proximity of a heavy mineral traffic ; or (2) injury to trade due to the diversion of traffic owing to the construction of a new street and the like. All these and many other alleged sources of damage had often been made the subject of claims for compensation. The first-mentioned cause of damage was easily dealt with ; but the latter was one in which it would always be difficult to settle the compensation. He would not object to give Companies, in cases of the latter kind, the power to try the question of the right to compensation before proceeding to determine the amount, if the necessary machinery could be provided. But a provision of the kind would have to be very carefully made, or a door would be opened to the introduction of all kinds of shadowy and untenable claims. As a case in point, he would instance the well-known case of Union Street, Southwark, through which, before the construction of the new street, the traffic of Southwark passed. It was previously a street of shops, commanding double the rents at which they are let since the diversion of the traffic, whilst the houses in the Belvedere and the York Roads, which before commanded only moderate rents, had greatly increased in value. Claims for compensation for injury of that kind could never be maintained, and he repeated, therefore, that any alteration in the Act having for its object the preliminary testing of the right to compensation would have to be very carefully framed, lest claims of the kind should acquire a shadow of legality. In writing the Paper, Mr. PHILBRICK had probably foreseen the difficulty, for he said,—“ Assuming, then, proper provision be made, enabling the promoters to test the legal right, the cardinal question arises, how is that right to be regulated, and when is a person to be held entitled, and when not ? ” He (Mr.

RYDE) would remark that in one case the judge had said,—
 “If you say a man is to be compensated by reason of the diversion of the traffic of a street, where is the principle to cease? A man, 100 miles off, may say, ‘I was better off when the traffic took that direction than I now am,’ and you will be involved in an endless inquiry.” This was the case of CAMERON, a baker, who claimed for injury to his business, owing to the diversion of the traffic under the Charing Cross station.

A careful distinction was drawn by Mr. PHILBRICK, in his Paper, between land actually taken, and land not taken but injuriously affected; and, as regarded the latter, he arrived at the conclusion that compensation should be limited to the damage which arose to the remaining land of the same owner, by reason of the works constructed on land taken from that owner. To put the case plainly, a man’s land might be crossed, say by a railway, at some particular point, without injury to his remaining land, so far as concerned the works constructed on land taken from him; but at some other point the railway might pass close to the windows of his house, and might do his property great injury; but because the railway was not there constructed on land taken from him, he was not to be compensated for the injury. He (Mr. RYDE) did not agree with that view. It was not often that a case of the kind arose, and when it did, it was dealt with in the discretion of the arbitrator or jury, and it was much better to let the law remain as it was than attempt to improve it by making special provision to meet such cases. There was difficulty, no doubt, in getting compensation for damage to land not actually taken; but surely if, as he understood the Act, it provided that a man whose land was taken was to receive the full value of that land, and be paid for any injury by severance or otherwise, as well as compensation for any

other losses or injuries sustained ; it also meant that he was to receive a fair compensation for any injury which he sustained, although the works which injured him were not on his land at all, but sufficiently near to do him injury.

He did not entirely agree with Mr. PHILBRICK as to the hardship of compelling Companies to purchase the whole of a property of which they required only a fractional part for the purposes of the undertaking. By the exercise of a little judgment in laying out a line of railway, some of the cases of this kind might be avoided. The rule among engineers seemed to be to go straight through everything, leaving the surveyor to get over the difficulties, thus created, as best he could.

The case of "BARTRUM and HARVEY" was referred to in the Paper ; but he (Mr. RYDE) had never been able to see anything very exceptional in that case. A man was to be paid the full value of his premises, and they might be estimated as being worth to him what he could get other premises for of the same kind. BARTRUM and HARVEY's case carried the principle very little beyond that point.

One of the injuriously affecting cases which Mr. PHILBRICK referred to was one of his (Mr. RYDE's) earliest cases, viz., PENNY and the South Eastern Railway Company. It occurred many years ago, and Lord CAMPBELL, in giving judgment upon it, with reference to an embankment of the railway, said, "Any party, not being a Railway Company, might build up a great tower and obstruct the view, but that was not a case which would give compensation."

The first group of sections of the Lands Clauses Act dealt with by Mr. PHILBRICK, referred to the purchase of land by agreement. In connection with this part of the Paper, it occurred to him (Mr. RYDE) that it should be placed on record, as a fact of which some were unaware, that the settlement of a claim for compensation by agree-

ment did not entitle the claimant to be paid his costs unless he made it part of the agreement that he should be paid them.

The author had referred to the clause of the Act which prescribes that there shall be a certificate signed by two justices, that all the capital of a Company shall have been subscribed before any compulsory powers are put in force. As this clause had been inserted in the Act for the protection of land-owners, he could not refrain from expressing his opinion that a certificate of the kind, for such a purpose, was not of the slightest utility.

The 21st section of the Act was much misunderstood. Many persons were under the impression that the claim must be made within 21 days after service of the notice to treat; but the idea was quite erroneous, and Mr. PHILBRICK had put the matter very clearly when he said, "If no reply be made to the notice, or if no agreement be come to within 21 days after service, as to the amount of compensation for the party's interest in the lands, and for any damage he may sustain, then the amount shall be settled as in the case of disputed compensation." There was nothing in the clause in any way compelling a claimant to make a claim within 21 days.

The author said, "It has been thought by some that justices are not the best tribunal to deal with cases of yearly tenants." All that he (Mr. RYDE) could say was, so far as he had been concerned with justices in these matters, the decisions—especially those of the London police magistrates—had been as satisfactory as those of any tribunal before which such matters could be brought. He knew a case in which the late Mr. COMBE, presiding at the Southwark police court, gave a yearly tenant nothing, where he (Mr. RYDE) had offered a considerable sum. In dealing with the case under section 121 of the Lands Clauses Act, the magistrate

said,—“I am asked to say whether this man’s unexpired term is worth anything. It has been proved that it is not. I am asked to say whether there is any just allowance to which he would have been entitled from an incoming tenant, and I say there is not. I am further asked to decide whether he has sustained any other loss or injury: he tells me he has taken another shop in as good a situation; and, therefore, I say this man sustains no loss or injury, and therefore he is not entitled to compensation.”

The well-known arbitration clauses were not so fully referred to in the Paper as they might have been. There was one doubtful point in connection with them on which he hoped to hear the opinion of gentlemen present,—it was as to the right to appoint arbitrators before the Company and the claimant had failed to agree upon a single arbitrator. The general scheme, as Mr. PHILBRICK correctly stated it, was “to entitle either party, unless a single arbitrator were agreed on, to appoint one to act on his behalf.”

The question of costs was a tender one to handle, and he felt strongly with reference to it. Was it to be supposed that a practical surveyor whose opinion was worth anything would make a valuation of property, and afterwards go into the witness box and give evidence respecting it, for such a sum as was allowed to the client by the taxing master? It was useless and unfair to perpetuate the present state of things in this respect; and, as he said on the last occasion, an arbitrator would not omit to consider the matter in estimating the loss sustained by the claimant.

Allusion was made by Mr. PHILBRICK to the Common Law Procedure Act, with reference to the practice of extending time. This, again, was a point demanding careful consideration. Sometimes it was to the interest of one side, and sometimes to that of the other, that an arbitration should be brought to a close within a reasonable length of

time ; and it could be so in all cases, if the provisions of the Lands Clauses Act were complied with. As regarded this point, the Act was, he thought, sufficient for all practical purposes, and would not gain by alteration. He had never met with any difficulty as to enlargement of time by mutual agreement in cases where such enlargement was necessary.

The 68th section had, very properly, been referred to by Mr. PHILBRICK as one of the most important clauses of the Act. It had long been a moot question, whether benefits conferred upon adjoining land of the same owner should be taken credit for in estimating the compensation for land taken or injured. Mr. PHILBRICK had put it clearly and correctly that they should not be taken into account, and gave reasons for that conclusion, with which he (Mr. RYDE) thought they must agree. Take the case of King Street, Westminster,—a very narrow street, much in need of widening. Now, suppose it were widened on the Parliament Street side, so as to take off a piece of some of the houses in the latter street. The houses in Parliament Street backed on to King Street, and it might be argued that they would be more valuable if King Street were wider. Was it fair, then, that the occupiers of the houses in Parliament Street, notwithstanding the fact that they might have less space than before the alteration, and be put to expense, should receive no compensation because of the benefits arising from the widening of King Street, while the houses on the opposite side of King Street shared the benefits to an equal degree though the occupiers had been put to no inconvenience, and had not to submit to a diminution of space ?

The 63rd section of the Lands Clauses Act, which was only intended to apply to cases where parties could not be found, gave the most implicit instructions to surveyors to be met with in the whole Act. It stated that “regard shall

be had by the surveyor not only to the value of the land, . . . but also to the damage sustained by reason of the severing of the lands taken from the other lands of the same owner or otherwise injuriously affecting such other lands by the exercise of the powers of the Act." Nothing could be more definite than these instructions, though their application referred only to a very limited portion of the Act.

In a succeeding paragraph of his Paper Mr. PHILBRICK remarked that—"One great and main failing in the Act was the impossibility of rectifying any injustice, however gross, unless there had been some excess of jurisdiction." He (Mr. RYDE) doubted whether manifest injustice was often done in such matters, and if were, it was more than compensated for by the one great and valuable feature of the Act—its finality.

He quite agreed with Mr. PHILBRICK's suggestion as to the creation of a court before which all cases occurring under the Acts should be heard.

He could not help thinking, moreover, that the court should consist of not less than two surveyors and a barrister,—the latter of whom would act in the character of an assessor. In advocating such a constitution for the court, he was not speaking simply in the interest of his own profession, for there were not many surveyors of high standing who would be willing to take the office on the terms likely to be offered; but because the questions to be decided before such a tribunal would be mainly questions on which the decisions of surveyors, acting as judges, would be likely to be satisfactory; while any tendency to irregularity in the proceedings of the court would be controlled and prevented by the presence of the third member, as legal assessor.

The work of such a court need not be limited to the settlement of compensations alone; but other matters, such

as the light and air questions, which arise in London and other great communities, should also be decided by it. In this way something like uniformity in the decisions would be obtained,—a point of great importance, as all would admit.

Section 92 (a most important section) was one which he thought required slight amendment so far as this, that whatever the freeholder required the Company to do, the lessee should be bound to agree to, and thus obviate the great difficulty which arose when the lessee and the freeholder desired exactly opposite things.

Mr. J. H. LLOYD (Associate of Council),—after an expression of thanks to Mr. PHILBRICK, for writing a Paper demanding so much labour and sacrifice of valuable time in its preparation, and pointing out one or two inaccuracies into which, as he conceived, his friend had inadvertently fallen,—proceeded to make some comments on a few of the questions with which the writer had so ably dealt.

In reference to the compensation to be paid for the purchase of land (as defined by the Act), he objected to the indiscriminate application, to all cases, of the rule of adding to the ascertained full value a per-centage for what was called compulsory sale. He thought that in the case of land ripe for building, and actually offered to the public for sale or letting, where the true value had been arrived at, the addition of a per-centage for a compulsory taking, except some fair allowance for the change of investment, was unnecessary and unreasonable. He objected also to an uniform and fixed per-centage on the value, however great or however small the value might be, thinking that the addition of 10 per cent. to (say) £80,000 or £100,000 was as excessive as the like addition to (say) £100 was inadequately little.

He then proceeded to deal with the question of the

damage to, or, as it was termed, the injurious affecting of, property; and, whilst agreeing, generally, with the observations of Mr. PHILBRICK on this head, he differed from him in his adoption and approval of the rule laid down by the courts of law that, where no land was actually taken, the right to compensation for the injurious affecting of property actually damaged depended on the question whether a legal right had been violated or interfered with. He thought it inconsistent and anomalous that, where a piece of land was taken, compensation for damage should attach, though in the causing of that damage no right had been interfered with, and that for a depreciation, however serious, of property, arising from the very same cause, but where no land of the owner of the property so affected was taken, no compensation could be awarded; and he suggested that the more just and rational principle would be to estimate the greater or less probability that, but for the operations of the Company, the damage would ever, or within any calculable time, have been inflicted by the adjoining owner for whom the Company had been substituted, and to assess the compensation accordingly.

He then dealt with the question raised by Mr. PHILBRICK, as to the expediency of providing a special tribunal for the determining of cases of compensation, and after strongly objecting to the leaving to the decision of a jury questions of the value of property, of which they could have no accurate knowledge, and admitting, with Mr. PHILBRICK, that the cases frequently involved difficult and important matters of law, which it was desirable should be dealt with and disposed of, without the cost and delay consequent upon the existing practice, he differed from him as to the remedy he proposed, his opinion being that if the cases were referred to two competent arbitrators or their umpire, with the power, and, when required by either party, the obliga-

tion to call in a legal assessor, no better tribunal could be devised, and the cost and delay so justly objected to would be removed.

He adverted next to the doctrine of reinstatement as laid down with approval in the Paper, and to the case of *BARTRUM* and *HARVEY* introduced by Mr. *RYDE* as illustrating the rule. He thought the principle was too broadly stated, and required some qualification. Where the new premises were intrinsically of greater value than those which were taken away, it seemed to him just that this difference of value should be taken into account; and he submitted that the correct rule would be to ascertain the additional annual charge to which the claimant was subject by the purchase or renting of the new premises, and to capitalize that charge by a less number of years' purchase than was applicable to the capitalization of the annual value of property. Otherwise he might, by disposing of the property, get the entire benefit of the difference in value between the premises he had left and those he had removed to, in respect of which difference he had, on the principle as laid down, already received full compensation.

Referring to the 92nd section of the Act, he pointed out the abuse to which that enactment, as interpreted and most unreasonably extended in its operation by decisions of the court, gave occasion, citing instances where the power which it gave to an owner or occupier, from whom a trifling and almost valueless bit of garden attached to a dwelling-house or a shop, or a corner of the yard of a large manufactory was required to be taken, to insist that the whole house, shop, or manufactory should be paid for with all its serious incidents of removal, loss of trade, and the like. This was a grievance pressing most hardly upon the promoters of public undertakings, for which a remedy should be found.

And, as this operated injuriously upon the promoters, so, on the other hand, there were cases which, in his opinion, sometimes worked unfairly against claimants. Yearly tenants for instance, though they had been long in the undisturbed occupation of their premises, and would probably not have been disturbed but for the exigencies of the promoters, were liable to be summarily dispossessed,—generally with a very inadequate, and sometimes, as in the case instanced by Mr. RYDE, without any compensation.

He thought that the reasonable chance of a continued occupation, especially where a trade, such as that of a small shopkeeper was concerned, ought to be taken into account.

So also, there was the case of premises being compulsorily required, of which the occupier had a lease with a very short time unexpired. Many instances of this kind had occurred, where the lessee would unquestionably have been able to obtain a renewal of his lease, and so have continued to carry on the premises, a profitable trade. Yet, according to strict rule, such a person would be dealt with as one who must, at the end of his short term, necessarily have removed, and his compensation for removal and loss of trade had been frittered away accordingly.

There were many other matters which, he thought, called for amendment, which time would not permit him to advert to. He hoped, at some future time, to be able to embody the alterations which a long experience had suggested to him as necessary or desirable, in a formal Bill, which he would submit to the consideration of the Institution.

Mr. W. J. BEADEL (Member) said that Mr. LLOYD appeared to think that there were many things in the Lands Clauses Act which were injurious both to claimants and to Companies. It had been said to be 30 years (though Mr. PHILBRICK put it at 50 years) since that Act came into operation; but it was quite certain that the railway system

had been instituted within the memory of a great number in that room, and that it had been successfully carried out under the provisions of that Act. In the working of an Act of the kind, there must, unquestionably, be some injustice done,—it was impossible to steer clear of it altogether; but the question was, whether, looking at its operation as a whole, justice or injustice had been the result. Anything which Mr. LLOYD said was, no doubt, entitled to great weight, as no one had had greater experience than himself, and no one had argued both sides more clearly or more successfully. He could not help thinking, however, that he had argued a little unfairly with reference to the question of compulsory sale, and the 10 per cent. which it was customary to add to the estimated value of the property. Mr. LLOYD contended that £10 added to a claim of £100 was a mere nothing, but that the same per-centage, applied to a claim of £100,000, made an addition to the purchase-money which was perfectly monstrous. Now, he (Mr. BEADEL) had been called upon to deal, occasionally, as many others present had, with estates of that magnitude.

[Mr. LLOYD said that his observations were made with respect to property which was in the market.]

Mr. BEADEL, resuming, said that he maintained, in opposition to the views of Mr. LLOYD, that £10,000 tacked on to a claim of £100,000, was not so much in proportion as £10 added to £100; and it would be found in dealing with estates of that character and magnitude, that £5,000 or £10,000 was very soon made, or very soon lost. Was it fair or just, if he owned a property, that a Company should come, armed with the powers which the Legislature had given them, and compel him, *nolens volens*, to sell that property, and give him nothing for it beyond its ordinary value? Was he to sell his property at its bare value, when he had no desire to sell at all? Surely, in addition to the full value, he was entitled to something for

being obliged to sell against his will—5, 10, or 20 per cent., whatever the right figure might be.

He agreed with Mr. LLOYD that a jury was about the worst tribunal before which questions of compensation could be determined, and this brought him to a point of great importance, so far as the Institution of Surveyors was concerned. When a compensation case was to be brought forward, the claimant naturally sought the opinion of those gentlemen who would enter heart and soul into his views, and who would make the best claim for him; whilst the Company, on the other hand, sought the aid of those by whom, as they thought, their interests would be best served. In this way it frequently happened that a number of witnesses on both sides were brought before the jury, who were men often utterly incompetent to form an opinion of the value, and who could only judge from the evidence. They had half-a-dozen witnesses on one side swearing that the property was worth so much, and a half-a-dozen on the other side swearing that it was worth scarcely anything at all; and it was natural that the decision of the jury should be governed by the number of the witnesses on one side or the other. He contended that there was no procedure so perfect or well suited for adjudication in cases of the kind as arbitration; the claimant appointing one arbitrator, and the Company the other, and thus having two men of experience and reputation, together with an assessor, to represent their respective interests. In this way he believed that a fair value would be given for the property. Whilst on that subject he might observe that surveyors could not be too careful to avoid being led into wrong figures, and the making claims which it was impossible to support.

On one other point he asked to say a word or two, as he felt very strongly with reference to it, and it was this. No sooner was it known that the Legislature had granted compulsory powers, for some object or another, than a cer-

tain class of so-called surveyors greedily sought out those who were likely to be interested in the property affected, and endeavoured to get the management of their claims. Nothing could be more injurious to the reputation of the profession than such practices, and the Institution strongly discountenanced them. The motto of the Society was, and should be—honour, uprightness, and independence; and he begged the younger Members of the Institution, present and absent, to avoid such shoals, which could never tend to the advantage of an individual who desired to maintain his position as a gentleman and a man of honour possessed of a proper regard for the principles of honesty and uprightness. He believed that a great number of the questions, which now went before juries or arbitrators, could be settled without the intervention of either; and one of the chief uses of the Institution was to encourage among the Members the inclination and the desire to meet each other as gentlemen; to exchange views with a feeling of confidence in each other, and to endeavour to arrive at the truth in the interests of the clients they represented.

Mr. H. SHIELD (Associate) said that when one considered how comparatively few and unimportant were the amendments which Mr. PHILBRICK suggested, even after his exhaustive survey of the Act, one was struck with the favourable contrast presented by this Act as compared with more modern legislation. No doubt one great reason for it was that the subject of the Lands Clauses Act was one entirely independent of political questions; and, therefore, that the Bill passed through the House with less tinkering and mutilation than was generally the case with extensive measures. From what had fallen from Mr. LLOYD, however, it was clear that the Act was not altogether perfection—indeed, far from it. He agreed with almost all that Mr. LLOYD had said, and his eyes had been

opened by him to more important and larger defects in the Act than his own experience had suggested to him. Mr. LLOYD pointed out that the right to compensation was prescribed in the 6th clause of the Railway Companies Act, and not in the Lands Clauses Act at all; but he thought it a proof of the soundness of Mr. PHILBRICK's remarks, when that gentleman suggested, as a technical blemish in the Act, that it provided that the compensation should be assessed before the question was tried whether the claimant had a right to compensation at all. Mr. LLOYD had pointed out a most important matter, which was this:—There were cases where property was seriously and permanently depreciated; yet, because no legal right was invaded, the owner had no right to compensation. To that it might be added, that a person had no *locus standi* to oppose in Parliament a Bill which threatened to inflict upon his property a serious injury without giving him a legal right to compensation, which was, he thought, a peculiar hardship. The answer to Mr. LLOYD's question—"Why should compensation require to be founded upon an invasion of a legal right?"—was, that if they did not take some such ground, there was no way of limiting the right. All sorts of absurd claims were made in respect of property declared to be injuriously affected. The circumstance of the bursting of the Sheffield reservoir, and the enormous destruction of property resulting from the rushing of the water down the valley, would be fresh in the recollection of Members. There were some most remarkable claims made for compensation on that occasion. One in particular, by a gentleman who occupied a house, conveniently situated for his business as an accoucheur to the inhabitants of that fertile valley; but, owing to the houses being destroyed, and the population dispersed, there was no opportunity left for the exercise of his calling; therefore he claimed to be compensated for the loss of his business. Another person, who previously drove a good business

as a ratcatcher, made a claim on the ground that the inundation destroyed all the rats. Those were extreme cases ; but he said that if there were not some clear foundation (such as the invasion of a legal right) for the claim for compensation, people would be at liberty to run into endless extravagances of the kind. He entirely agreed with Mr. LLOYD and the last speaker, with regard to the functions of surveyors in matters of this kind, and he was powerfully impressed with the amount of judicial ability displayed by members of that profession ; but with the existing tribunal of arbitration, he confessed he did not see the necessity for a special court, such as Mr. PHILBRICK had suggested, and as Mr. LLOYD and Mr. RYDE appeared to desire. At all events, he was not aware of the existence of such a continuous glut of compensation cases as would be sufficient to keep such a court as Mr. PHILBRICK suggested in a healthy state of employment ; and he did not think that an economical Government would approve of the establishment of a court on the liberal terms which Mr. RYDE suggested.

Mr. R. C. DRIVER (Member) said that his uncles, whom he succeeded in business, were the surveyors and valuers of the Brighton and Great Western Railways (two of the earliest lines promoted in England), for the purpose of purchasing the lands and properties required, and he had heard them say that, taking the judgments given both by juries and umpires, the Companies were satisfied with the general results. He himself had had, within the last few years, more than a thousand cases of the kind, principally on behalf of claimants, and was able to say that the verdicts given in contested cases before those tribunals had proved, with slight exceptions, satisfactory to them. He thought, therefore, that the working of the Lands Clauses Act bore testimony to the fact that the framers of it were men of great ability. He only mentioned this

circumstance in order to dispute the alleged necessity for a court of appeal. It would, he thought, be a most disastrous thing for a client, after having incurred the great cost of a trial, to have the decision disputed upon some merely technical point. Take the case of an insolvent Company, of which there had been many lately. How many verdicts would they not dispute for the mere purpose of delaying the payment of the purchase-money? He thought, therefore, that a power of appeal, unless in respect of some very great legal informality, was quite uncalled for.

The question of costs had been alluded to. It was a very serious matter for claimants. The Companies, of course, were in a position to employ the most able and astute counsel, and they also had at their call the best men that could be found as skilled witnesses; it followed that the claimant, knowing that to be the case, naturally engaged the best counsel he could get, and, if possible, witnesses equal to those secured by the Company. That was all very well so far, but when the costs came to be taxed, the taxing master might say—"Oh! but you had no right to engage such counsel as A or B, or witnesses of that character. You might have had people at less expense. I cannot allow these fees to A or B, or for more than one skilled witness." That was, he thought, a monstrous thing, and an injustice to the claimant.

[Mr. LLOYD said he agreed with the speaker.]

Mr. DRIVER said some alteration in the Lands Clauses Act was needed whereby claimants might be placed upon the same footing, with regard to costs, as the Companies were on.

On the motion of Mr. W. T. MARRIOTT, the discussion was then adjourned.

AT
THE ORDINARY GENERAL MEETING,

Held on Monday, February 2nd, 1874,

THE PRESIDENT IN THE CHAIR,

The discussion on the Paper by Mr. F. A. PHILBRICK, entitled "The Lands Clauses Consolidation Acts, with some suggestions for their amendment," was resumed by

Mr. W. T. MARRIOTT (Visitor), who said that after the very able speeches made at the last Meeting, he felt considerable diffidence in rising to take part in the debate. He would say at the outset, that with some of the remarks made at the last Meeting, he entirely disagreed; first, with regard to the tribunals to which cases under the Lands Clauses Act were now referred. All present knew that the tribunal was either a jury or arbitrators, and that the claimant could carry his case before one or the other tribunal at his option; the Companies however, had no choice, but must go before a jury in most cases, and before arbitrators, only when the claimant so elected. Now, in considering any amendments which might be desirable in the Act, the time and circumstances under which the Act was passed, and the intentions of the Legislature in passing it, must be borne in mind. The Act was passed in the year 1845, and was essentially a compromise between the great land-owners and the Companies. The deliberations of the Meeting, therefore, should be

confined to the consideration of such practical amendments as were likely to be sanctioned by Parliament,—as any proposition which merely represented the interests of individuals (whether Companies or claimants), would be certain to be rejected.

He did not think that the views of Mr. LLOYD and Mr. BEADEL would find acceptance in the House of Commons. Both those gentlemen made an attack upon juries, which they represented as a tribunal consisting of twelve men, packed helter-skelter, and utterly unfit to weigh and balance the conflicting evidence of experts. That might be so, but it was not the fault of the Lands Clauses Act. The argument, if it had any weight, applied with equal force to all other cases, and affected the whole principle of trial by jury.

Pathological and physiological evidence was as abstruse as any which arose in a compensation case; and yet, every day, there were cases in which physicians were called on each side to speak to the physical condition of people and their future prospects of health, and upon that evidence juries had to give their decisions.

Then, again, in the case of trials involving questions of patent rights, mechanical witnesses were called on both sides, who gave evidence quite as technical, if not more so, than that which was given by surveyors; but juries were considered competent to deal with such cases, and did deal with them.

Parliament would never consent to abolish juries, and he believed any attempt to remove cases under the Lands Clauses Act from the decision of juries or arbitrators would be futile. Mr. RYDE proposed a tribunal in the place of juries; and, without expressing any particular satisfaction with juries, he (Mr. MARRIOTT) thought the tribunal which Mr. RYDE proposed was an infinitely worse one. Mr. RYDE's proposed tribunal was to be composed of one barrister and two surveyors,

who should constitute a perpetual court, before whom cases under this Act should be decided. But it must be borne in mind that the appointments would be made by the Government, and such appointments were not of the best, and were often made for some other reasons than inherent fitness or capacity. That being so, it was possible to conceive that in the court proposed by Mr. RYDE, they might have a bad or incompetent tribunal for 20 or 30 years at a stretch. There was this consolation attaching to the jury system, both as regarded the interests of claimants and Companies, that if they got an unfavourable verdict in one case, they might comfort themselves with the expectation that, on the next occasion, they would be more fortunate. Mr. PHILBRICK, on the other hand, did not suggest a new tribunal for the trial of facts, but for questions of law only. He (Mr. MARRIOTT) thought that the same arguments applied to Mr. PHILBRICK's as to Mr. RYDE's proposal. Mr. PHILBRICK asked, "Why not create a court presided over by a judge, and give a power of appeal to a higher court, such as that created by the Judicature Act of last session?" Now he could not help thinking that one great advantage in the present constitution of our courts was the great variety of the matters with which the judges were called upon to deal,—their minds, in consequence, becoming enlarged, and liberated from prejudice. Moreover, they did not sit alone, but acted with other judges, and each had the advantage of the other's intelligence, and was kept in check by the others. On the whole, therefore, the decisions of the courts gave satisfaction. Was it possible, on the other hand, to imagine a more narrowing influence on the mind than the functions of such a court as was suggested? The tendency of the age was to do away with all special courts. If there were to be a tribunal like that which Mr. PHILBRICK suggested, there ought to be most

special reasons shown for its establishment. Mr. PHILBRICK, as he understood him, argued in favour of a court established to deal solely with cases arising under the Lands Clauses Act,—something similar to the new railway commission. It must be remembered, however, that the latter court had a scope far wider than merely deciding upon the provisions of one Act of Parliament, like the Lands Clauses Act. He believed that such a court, so far from accelerating, would delay the course of the law in cases of compensation.

He thought there might be some amendment of the Act with regard to jury cases, and he would suggest a practical one which might be carried without offending the prejudices of Parliament or of the public at large. He thought that an amendment of this kind might be introduced,—that after 21 days' notice by the Company, if the claimant failed to make choice of arbitrators or jury, the Company might make the choice themselves. The result would, he believed, be that there would be more arbitration cases than jury cases. He had no doubt that Companies, generally, would go to arbitration, as arbitrators, on the whole, gave the best decisions.

Then, with regard to questions of law, there was, no doubt, considerable reason to wish that the law should be decided more definitely. Mr. PHILBRICK argued that the law of the case should be established first and the question of damage settled afterwards. No doubt the law, as it now stood, was most cumbrous. The liability could not be determined till the amount of damage was ascertained, and even then only by a legal action upon the award, which meant two actions instead of one. If Mr. PHILBRICK meant that the law should be ascertained first, the answer was that if Companies alone had the opportunity of testing the law, they would do so in many cases in order to defer

payment. Time was sometimes everything to a Company, and, he thought, if the plan of Mr. PHILBRICK were adopted, some Companies would invariably appeal. It might be asked—Was there any remedy? He (Mr. MARRIOTT) said the remedy was the ordinary common law remedy, where, if a man made a declaration, and the defendant demurred to that declaration, he could apply to a judge in chambers for a summons, that questions of law raised by the demurrer should be decided before the facts went before a jury. As a rule, judges in chambers would not grant such an application, unless it were founded upon substantial and not upon specious grounds. He thought a clause might be introduced to the effect that a Company, when they thought they were under no liability, should be permitted to take out a summons before a judge in chambers, asking for an order that the case should not go before arbitrators or juries till the legal question was decided. If they did so, they would have to show that there was solid ground for resisting the legal claim; and the chances were that, in the majority of cases, the legal case would be decided first, as it was most important it should be. There might be forty or fifty claims against a Company for “injuriously affecting.” The idea of the Company might be that they were not liable for those claims. It seemed monstrous that the whole of those claims should go before arbitrators or juries, and that damages should be assessed on the assumption that there were claims for damages. He (Mr. MARRIOTT) submitted that what he had suggested would be a practical and real amendment for the removal of the grievance complained of, and would probably be passed if introduced into the House of Commons.

The 92nd section of the Lands Clauses Act was one referred to and complained of bitterly by Mr. LLOYD. No doubt there were many grievances which occurred under

that clause. All present were familiar with the Tunnel case, and the case of St. Thomas's Hospital, and no doubt there had been decisions of the law courts which had imposed great hardships upon Companies. He would venture to suggest one amendment in the Act, which might do something towards meeting the justice of the case. It was this, that the tribunal by whom the amount of damage was assessed (whether arbitrators or a jury), should determine whether the Company should be compelled to take the whole of the property or not; and where only small portions of premises were taken, he thought the decision would probably, in many cases, be in favour of the Companies. Of course, no general law could be laid down to meet all or individual cases. They could not form a judgment, whether parties should be compelled to take all the property or not, unless they saw the premises, and that could be done either by a jury or by arbitrators. In one case, such a portion of a property might be taken as to cause damage to the whole, whilst, in another case, no damage whatever would be occasioned. Take the case of a school and playground. A portion of the playground might be taken without doing harm to the school; but, under this section of the Act, a Company would be compelled to take the whole. He thought that an amendment of the 92nd clause, to the extent which he had suggested, would be beneficial, and would relieve Companies to a great extent from some of the hardships which they now occasionally had to endure.

He did not agree with the remarks of Mr. LLOYD with regard to the 10 per cent. bonus for compulsory sale. When land was taken by compulsion, he (Mr. MARRIOTT) thought some bonus beyond the value assessed should be given, and he did not think that it ought to be less than the usual 10 per cent. Mr. LLOYD said that there was no proportion between £10 upon a claim of £100 and £10,000 upon one of

£100,000; but he (Mr. MARRIOTT) contended that the £10 might be as important to the claimant of £100 as the £10,000 to the owner of the property valued at £100,000. He felt convinced that an attempt to introduce any change in the existing practice would be unsuccessful,—the principle (and it was a just and intelligible one) being that a fair value for the property taken should be given to the claimant, and, in addition, a bonus for compulsory sale.

The law with regard to costs was open to improvement. Under the present system they were unevenly apportioned. He would suggest that the costs, as in common law actions, should abide the event. In cases where the award was below, or only equal to the sum offered by the Company, the claimant ought fairly to be made to pay the costs which the Company was put to in resisting that claim. There was one other amendment he would suggest in the interests of Companies,—namely, that further and better particulars should be furnished by claimants, and that the several heads under which claims were made should be properly set forth. Many other emendations of this Act might be suggested, but those he had mentioned struck him most. On the whole, he agreed with the remarks of Mr. RYDE and Mr. BEADEL that, considering the Act had been in operation since 1845, it had worked well.

Mr. J. CLUTTON (Past President) agreed with the last speaker, that the less the existing law was interfered with the better. The Lands Clauses Act, like everything else, was open to improvement; but, on the whole, it had proved valuable both to Companies and claimants, and he doubted whether many important changes were either desirable or necessary. The few observations which he proposed to make would be entirely from the surveyor's point of view. First, as to the trial of compensation cases by jury. No doubt the

system was regarded by the public with considerable favour ; but, practically, he thought there could not be a worse tribunal for the purpose of assessing compensations. Again, he did not think the arbitration clauses, as they stood, were as good as they might be. Two arbitrators were appointed ; but the moment they disagreed, or the time for the exercise of their powers elapsed, their functions ceased. He thought that in arbitrations,—particularly in large cases,—it was desirable that arbitrators and umpires should sit together as one tribunal, and not, as was now the case, without concurrent functions. He understood the last speaker to say that questions arising under the 92nd section of the Act would be better left to a tribunal of that kind. He (Mr. CLUTTON) entirely agreed with that view, more especially in cases where the question of taking the whole or part of a property was raised ; and he thought it would be well to have some amendment of that clause, and that the arbitrators appointed should decide whether or not the whole of the premises should be taken before they proceeded to assess the compensation.

He was decidedly adverse to the principle of giving the same bonus in all cases of compulsory sale, without reference to special circumstances. If a strip of land were taken out of a man's property, the consideration, he thought, should be much larger than where the whole or a large block of a property was taken. Again, if a man had building land or brick-earth to dispose of, and it was taken compulsorily, was he equitably entitled to the same additional per-centage, in respect of compulsory sale, as the man whose property consisted of a house or garden ? If a farm, with the crops upon it, were taken, nobody dreamt of giving per-centage upon the value of the crops, for the plain and simple reason that a tenant could not realize his money till

the crops were sold; and the case of building land and that of brick-earth was, to his mind, precisely similar.

The question of costs was a difficult and delicate one to handle; and, personally, he had always felt it a great comfort to think that arbitrators had been relieved from the duty of deciding upon them.

One or two valuable alterations had already been effected in the Lands Clauses Act, especially as regarded the question of deposit. The clause, as it now stood, gave to the surveyors appointed by the Board of Trade, very valuable powers, inasmuch as it set forth that in addition to the valuation of the property, the surveyor should estimate the damage by severance and otherwise.

These were a few of the points which struck him as a surveyor.

Mr. F. T. D. LEDGARD (Associate) said that he entirely agreed with Mr. RYDE's opinion that no power of appeal should be given against the decision of arbitrators. No doubt a few cases of hardship, for which it was impossible to make provision in a general statute, occasionally arose; but the most valuable feature of the Act, as had been already pointed out, was its finality. If the tribunal were competent to try the question, he failed to see what good could be derived from rendering its decision,—arrived at after an examination of all the facts,—liable to disturbance because the Company might not be quite satisfied with it. In cases of appeal, the result was very often in favour of the suitor who had the longest purse; and he agreed with Mr. RYDE that, in such cases, it would generally be the Companies who would raise the question, and not the claimants. The tribunals as at present constituted were, he thought, most competent to give decisions in questions

of compensation. The absence of a power of appeal was not peculiar to matters of the kind under discussion. In questions of account, which were referred to the arbitration of the Masters of the Common Law Courts, there was also no appeal; and he was not aware of any conspicuous injustice having been done by their decisions.

In considering the fitness of the jury system, as applied to the trial of compensation cases, one material fact must be borne in mind,—namely, that, in most instances, the question of trade claims had to be considered, as well as those of property. In the latter case, no doubt, surveyors were fitter to try the question, but in the former, where it was a question as to how far a trade was beneficial or not, he thought that no tribunal could be more desirable than a jury, constituted of men of various trades,—some of them, perhaps, practically acquainted with the particular trade under consideration.

It was a hardship that the question of costs was not left to arbitrators. Companies had sometimes to deal with claims, the particulars of which they knew very little about till the case came on, and in which, had they been better informed, an offer would probably have been made. He might refer to a case known to most gentlemen in the room, where, if the Company had had the knowledge which they subsequently acquired, such an offer would undoubtedly have been made as, he thought, would have had the effect of relieving them from the payment of the claimant's costs. Arbitrators should have power to say by whom and in what proportion the costs should be borne.

He would record his experience of the practical utility of the trial of the claims of tenants not having an interest greater than from year to year, by the present tribunals (in London), viz., the police magistrates. The reason why that system had worked beneficially was, probably, because of its elasticity. Some of the cases were those

of even weekly tenants ; and a magistrate, who was acquainted with the district, was the best person to deal with the claims of people living in his district, owing to his acquaintance with their occupations and habits of life, and their prospects of finding other accommodation. In one case, a claim of £300 was entered by a person who alleged that he was a yearly tenant ; but it turned out, on investigation, that he was neither a yearly nor a quarterly but only a weekly tenant, and the magistrate awarded him 9s. without costs.

He agreed with Mr. LLOYD, as to the hardship of drawing a hard and fast line in cases where the occupier had a lease with only a short term unexpired.

There was a case of peculiar hardship, and, if the proposed amendment of this and other Acts connected with it should, at any time, be entertained, it was one which should not be lost sight of, viz.:—that of BRAND and the Hammersmith Railway Company. That case was decided on the 6th and 16th sections of the Railway Clauses Act ; but those clauses were so mixed up with the 49th and 68th sections of the Lands Clauses Act, that, on considering any amendments of those clauses, a case of the kind he referred to should be provided for as well as other cases before juries ; because the words “injuriously affecting,” by reason of the execution of the works, received the most serious consideration of the judges before whom the case was tried ; and he thought that was a case standing alone from its peculiar hardship.

He did not see why, when injury was inflicted by a Railway Company or public body, compensation should be given which would not have been given had it been done by a private individual, and where no remedy at law would have been had. . He knew a case in which two neighbours quarrelled with respect to a boundary,

where one of the parties, to spite the other, erected an embankment 90 feet high. The question was tried at Winchester. It gave no right of action to the party whose prospect was spoilt, the law saying that there was no right of action, inasmuch as the party had erected the embankment upon his own land. He (Mr. LEDGARD) failed to see why the act of an individual should not afford a ground of action, as much as that of a Company. The case of BRAND and the Hammersmith Railway Company showed that although in that case, practically, injury was done, yet at common law there was no remedy. The judges who were called in to advise on the appeal to the Lords, ruled that there was a clear right of action taken away by the statute. He did not see why these cases of injuriously affecting should be confined to the mere construction of the works; and he thought compensation should be given where the right of action existed but for the statute.

Mr. PHILBRICK had not referred to that case, which was one which constituted an argument in favour of not abiding by the hard and fast rule of giving compensation when material damage was done only in cases where, but for the statute, a right of action would have existed. In considering any amendments of this Act, he (Mr. LEDGARD) suggested that this question of compensation after construction, in cases where the right of action was taken away by the statute, should not be overlooked. Subject to these remarks, he agreed that the practical working of the Act had been of the greatest utility.

Mr. W. H. SHAW (Visitor) said that he had not the advantage of hearing Mr. PHILBRICK's Paper, but he would venture to offer one or two observations. He begged to express his gratitude for the remarks of Mr. CLUTTON with regard to the question of compensation. He quite agreed with the suggestion as to determining the liability before assessing

the damage. As a practical man, conversant with matters of the kind, he was impressed with the absurdity of going through elaborate processes to estimate damages which it might turn out afterwards had no foundation in law. It was a state of things which called urgently for amendment, not only in the interests of Companies, but of claimants also.

Professor KERR (Visitor) observed that the questions under discussion divided themselves into the two categories of law and practice. He believed that surveyors were perfectly competent to deal with questions of law arising under the Act, and could not help expressing an opinion that lawyers were of very little use in questions of practice.

The greater proportion of the points now at issue were simple questions of practice, which surveyors could settle for themselves.

It struck him that one modification in practice was particularly desirable, and he was gratified to find that Mr. CLUTTON had come to the same conclusion as himself. It seemed to him that when a single umpire sat on a question on which the two arbitrators had disagreed, and the arbitrators ceased, from the circumstance of his intervention, to deal with the question, a great mistake was made.

By a mere custom of practice, the arbitrators were precluded from pleading their respective cases before the umpire, and he believed he was right in saying that in many instances the discontented party attributed his defeat to some misunderstanding on the part of the umpire, which would not have arisen if his arbitrator had been allowed to plead the case. He believed, also, that the adoption of the system which he advocated would result in a considerable decrease in the expenses of arbitration.

Mr. J. CLUTTON begged to say, personally, that he could

not accept the compliment which Professor KERR had paid to the surveyors ; for of all people to plead a case before an umpire, surveyors were about the worst. On the other hand, barristers were trained to the business. In his opinion, arbitration proceedings were often lengthened from not being conducted by barristers of experience.

Mr. C. STEPHENSON (Member) agreed with his friend who had just spoken, that surveyors were not calculated, by their training and habits, to take the place of lawyers in conducting the proceedings of arbitrations. He thought, moreover, that those who were in the habit of attending to these cases, and had the advantage of a large practice, conducted them better than the gentlemen they met with in Westminster Hall, who, when introduced into an arbitration room, lengthened the proceedings to the cost of both parties, and very frequently missed the points which would be made by others more conversant with such matters. The 10 per cent. bonus had received a considerable share of attention in the course of the discussion, and he could only say that he had done all in his power to do away with its uniform application to all cases. A previous speaker had instanced the case of the estate of a speculative builder taken compulsorily for some purpose, and for which full value would be given. So far from the seller receiving any bonus, he should, in his opinion, grant a discount to the purchaser who at once provided him with a market for the property which he wanted to sell, and which was liable to all the fluctuations of value to which such property was subject. Many builders would have rejoiced if they had sold their land in 1865 instead of keeping it till 1867, and would have thought it a very slight hardship to have been called upon by a Railway Company to part with it in the latter year. The Hammersmith Railway case, referred to by Mr. LEDGARD, was one to be approached

cautiously, as opening up the large question of consequential damage. It was a wide proposition to enunciate, that a Company should be held liable for a species of damage for which no claim could be made against a private individual. He knew an instance, in one of the Midland counties, in which an action was brought against a Company for raising an embanked approach obstructing the view in front of some houses, and judgment was there given against the Company. Shortly afterwards, a large manufactory was built immediately opposite the adjoining houses, quite as injurious as the Company's embankment, which was merely a raised road approach, but, in the latter case, no damages could be obtained. He was familiar with the case tried at Winchester, which Mr. LEDGARD had mentioned, and could state from personal knowledge that very little damage was done by the embankment which he described. No doubt was a cruel thing to do, but the view lost was that only of a few yards of shore at low water. The action was not brought with respect to the embankment, but for interfering with the drainage of the property. He might add that he acted as assessor for the learned gentleman to whom the case was referred.

He agreed that tenants from year to year were often subject to great hardships under the Act. Many of them had been in their occupations for a great length of time, and, when removed to make way for public improvements, or the works of Companies, received the most miserable dole in the shape of compensation.

He had in mind an estate near Charing Cross, where there had been no leases for many years; and it would be a hard case for the traders occupying houses on that estate to be compulsorily removed from their occupations, and receive the mere pittance to which, as yearly tenants, they were legally entitled.

There was another point to which he would call attention, as one which should not be forgotten in any future amendment of the Act,—that in taking away a portion from an estate, the benefits which often accrued to the owner from the scheme, should not be ignored in assessing the compensation. There were many cases of that kind, and he thought there was a special clause in the Thames Embankment Act, giving power to juries to deal with such cases.

Mr. PHILBRICK : Only in the case of Crown lessees, who take a slip of land.

Mr. STEPHENSON thought there was a clause of the kind, to which he had referred, in the first Thames Embankment Act.

One case of great hardship to a Railway Company had occurred in connection with some houses on Snow Hill, which had been purposely shut up for many years; but notwithstanding, the 10 per cent. bonus was claimed, and, he believed, allowed.

Mr. DRIVER observed that he believed that all that was claimed beyond the value was such a sum as would have put the houses in repair.

Mr. STEPHENSON said that another case in point was that of the Borough Road Wheel Works. The property was in the market for several years, and bills to this effect were stuck all over the premises when the jury viewed; yet the 10 per cent. was claimed and allowed.

Mr. PHILBRICK said he would now make a few remarks by way of reply. He might be permitted to say, in the

first place, that when, at the President's suggestion, he undertook to write his Paper, he had no idea that the matter which he proposed to bring before the Society would elicit so much, and, he was bound to say, such friendly criticism as, on the whole, it had called forth. The subject was an exceedingly wide one, and to compass it within the limits of a single Paper appeared to him more than it was possible to achieve. * He could not help feeling that, in going beyond the province of the lawyer, he might possibly have touched upon topics which were more strictly surveyors' questions; but his desire to give the greatest practical completeness to his Paper must be his apology.

On the whole, he thought that the suggestions made in the course of the discussion were of a sound and practical nature. He passed by one or two observations made by Mr. LLOYD,—in which he sought to call attention to the fact that the compensation clauses of the Lands Clauses Act were different in effect from the combined clauses of the Lands Clauses Act and the Railway Clauses Act,—with the remark that, if the effect of the Lands Clauses Act as applied to Railway Companies had been the subject of discussion in the Paper, much which Mr. LLOYD said under that head would have been relevant; but they were dealing with the Lands Clauses Act, and to that Act he (Mr. PHILBRICK) entirely confined his remarks.

There were one or two matters only on which, in the course of the discussion, any considerable divergence of opinion had been expressed. One was as to the allowance of 10 per cent. That was the amount which was ordinarily given for compulsory sale, although, as Mr. CLUTTON stated, 25 per cent. was usually given in the case of agricultural land; and one must therefore see that, practically, the allowance for compulsory sale must be left to the discretion of whatever tribunal the case was to be decided by. He ventured,

however, to say that the problem to be solved was, how the bargain, under circumstances of legal interference, could be so adjusted as to correspond with that which, if free, the seller would probably make for himself. The only possible solution of the difficulty was to be found in an increase in the price, varying according to the circumstances of the case. To attempt to fix an universal rule by which the amount should be prescribed would be wholly useless, and those who attempted it would find themselves adrift. He need hardly say, therefore, that he never intended to lay down an axiom that a compulsory per-centage should be given in all cases; still less, to say that there should be a hard and fast rule. In some cases, 50 per cent. would be a small sum to allow, whilst, in others, 10 per cent. would be an exaggerated amount; and, where a public body took property for which a customer was wanted, it was desirable that some modification in the principle should be adopted.

Another subject on which contrary opinions had been expressed was as to a court of appeal. It had been said—he thought, with great truth—that in all these matters one very desirable element was finality, but another most desirable element was promptness; and, with a reasonably good tribunal, there should be no addition to the complaints of the law's delay. One might be inclined to put up with a small amount of injustice to obtain a prompt decision; and he should think it a thing greatly to be deplored if any amendment were made which enabled either party to throw obstacles in the way of the other, or one side to harass the other by tiresome and expensive litigation. At the same time he hoped that those who had spoken on the subject of tribunals to deal with these matters, had not lost sight of the fact that, as matters stood at present, when the compensation had been assessed according to the best ability of the arbitrators or jury as the case might be, the public

body might decline to pay, while refraining from taking steps to set aside the award, and merely resting upon their oars. Under these circumstances the owner of the property had no remedy but an action at law, and that action could be carried, if either party chose, to the highest court of the realm. That was the law, and in venturing to suggest another tribunal, he did so on the ground that the tribunals, as at present constituted, did not so thoroughly deal with these cases as one charged with the special duty might do. His proposal amounted, in fact, to an improvement of the existing tribunals to an extent which would accelerate the settlement of these cases rather than cause delay or foster litigation.

It was objected by Mr. SHIELD that there would hardly be work enough for such a court. He (Mr. PHILBRICK) thought, however, that if the whole of the cases throughout the country came before it, there would be employment enough for a judge whose capacity for work was as great as that of our judges generally. Another gentleman had said that the tendency of such a court would be to narrow the views of the judge who devoted himself to the decision of such cases as a special branch of the profession. He (Mr. PHILBRICK) thought, however, that the experience of all who had been called upon to deal with these cases would indicate the contrary as the probable result. No class of cases called for the exercise of more acuteness.

A point referred to by Mr. LLOYD, viz., how the right of compensation for "injuriously affecting" was to be limited, was a most difficult one to deal with. Many suggestions had been made with reference to that object. One was to limit the right to compensation to the invasion of legal rights. Mr. LLOYD did not refer to any specific case, but stated generally that where damage had been occasioned, the right to compensation should follow. But, again, he (Mr. PHILBRICK)

asked, where could they limit that right, and where was the line to be drawn? Was the compensation for damage declared to have been done to depend upon the views of a particular set of gentlemen who might happen to take extreme or peculiar views and was it to rest with the tribunal to adopt or reject their views as they might see fit? If so, instead of a clear and certain right, which was of primary importance in dealing with such cases, they would have a right varying according to the prejudices or whims of the moment, as the current of feeling set either against individuals or Companies—a state of things which would add to the miseries of the law's uncertainty a thousand-fold.

In conclusion, he would refer briefly to one or two other suggestions which had been made in the course of the discussion. One gentleman suggested that the umpire and arbitrators should sit together for the purpose of making one tribunal. That would be, he presumed, in cases where the arbitrators differed. This, he thought, would be a manifest improvement. At present, where the arbitrators differed, they were precluded from sitting with the umpire; but that was precisely the case in which the umpire ought to have the benefit of their views—not of their evidence, for he strongly objected to gentlemen who filled the position of arbitrators going into the witness box; and in all cases he had steadily set his face against a practice of the kind. Any method, however, by which, as the case progressed, the arbitrators could explain their divergences of opinion to the umpire, would be of great assistance to him; and he (Mr. PHILBRICK) had never known more satisfactory cases than those in which that system had been adopted.

One other delicate and difficult question was that of costs. As a rule, when a person manifestly had right on his side and established it against another, he ought not to be called upon

to put his hand into his pocket to get by law that which was unfairly withheld from him. On the other hand, if a party had to defend himself against an unfounded claim, he ought not to be put to the expense of defending himself against it. Where, however, property was taken compulsorily, he thought the costs of fairly investigating the claim and the extent to which private rights were violated, ought to be borne by the Company, and not by the private vendor.

He would call attention to one feature in these cases in which surveyors were especially interested. Under the Lands Clauses Act, when a Company bought land, they bought it out and out; but if the body were a Railway Company, they only obtained the land and the right to execute works upon it, and had to pay for the mineral rights in addition to the price of the land. There could be no doubt that tenants having short interests were hardly dealt with; for it must be admitted that besides the absolute term of the yearly tenancy or the fag end of the lease, as the case might be, there was an element of value, which for want of a better term, he would call the goodwill of possession. The man was in possession of the premises, and was actually carrying on a business in them. The occupation was worth more to him than to anybody else; and the landlord would, in most cases, prefer to keep the old tenant. If he were turned out, it was clear that he was deprived of the chance of renewing the lease, although he could not be compensated for such a claim as for actual property. He had always held that there was a distinct value attaching to the mere fact of possession, which ought to be taken into consideration and fairly dealt with. It must not be lost sight of, however, that in dealing with yearly tenants, the Company, when they came to deal with the freeholder, had to pay the value of property subject only to yearly tenancy,

and on the principle that the sum of the parts was not greater than the whole they could not be called upon to pay twice over.

In conclusion, he would again express the hope that, if the Act should be amended, as in certain respects he thought it required to be, the main provisions would be retained.

The PRESIDENT said he had hoped to have had an opportunity of offering a few observations upon the practical working of the Act, but at that late hour he would not detain the Meeting further. He thought, with Mr. PHILBRICK, that there were some serious defects in it. He hoped that on a future occasion, when Mr. LLOYD redeemed his promise of addressing himself to the emendation of the Act, he should have an opportunity of expressing his own views with reference to it.

The Meeting then adjourned.

THE SELF-SOWN OAK WOODS OF SUSSEX.

By RALPH W. CLUTTON, ASSOCIATE.

*Read at the Ordinary General Meeting of the INSTITUTION OF SURVEYORS,
February 16th, 1874.*

EDWARD NORTON CLIFTON, PRESIDENT, IN THE CHAIR.

ALTHOUGH this Paper is entitled "The Self-sown Oak Woods of Sussex," I propose that the remarks I am about to make should refer also to those portions of Surrey and Kent which are—with the timber-growing part of Sussex—comprised under the name of the wealds of Surrey, Sussex, and Kent. I may also state that portions of Hampshire are very similar to the three counties above-mentioned.

The weald, as is well known, is the district lying between the ranges of the north and south chalk hills, having Hampshire as its western boundary. Nearly the whole of this tract is peculiarly suitable for the growth of oak timber. There is, however, a forest ridge running east and west, about midway between the chalk ranges, called "St. Leonard's Forest," which, being a light sandy soil of poor quality, is, to a considerable extent, still in a state of heathy forest, and more suitable, in the first instance, for the growth of larch and fir trees than for oak.

The oak tree may be said to be the weed of the soil throughout great part of the weald. This is so much the case, that neglected grass fields, or fields laid down with

furzes, soon become covered with a plant of young oaks; and, as a rule, all inclosed coppices throw up an indigenous crop of oak, and the planting of the tree is scarcely ever practised.

Sussex oak has long been celebrated for its quality and suitability for shipbuilding, rearing, and cleaving. That grown in the wealds of Surrey and Kent has usually been classed under the name of Sussex oak. The bark throughout this district is also of superior quality, and commands a higher price than almost any other in the island.

The weald, however, now presents a very different aspect from that of the same tract of country at the beginning of this century. The broad hedgerows which then existed round nearly every field, and which produced the best timber for shipbuilding, have in great part, disappeared before improved agriculture and the reduced price of timber. Any one looking over the weald from an elevated spot 50 or 60 years ago, would have supposed it to be a large forest of oak trees. It appears wonderful to a modern farmer that any one could have been found to occupy land divided as it then was, into small fields averaging from 5 to 7 acres, surrounded by underwood and large-headed oaks—we have records of oak timber to the value of £10,000 having been sold at one time, from farms letting at £100 per annum; and in the year 1824—on a small farm then letting at £28 per annum—timber was sold to the amount of £2,800.

The price of timber since the commencement of the century has varied to a very large extent. We have records of sales at from 40s. to 50s. per load of 50 feet, with its top and bark, up to 200s. and 300s., and this high price has now receded to 100s. and 120s.,—iron and imported timber having in a great measure taken the place of oak for shipbuilding and other purposes.

There is still much timber growing in the reduced hedge-

rows in Sussex. This, however, is yearly diminishing, and the principal growth of oak is confined to inclosed coppices.

Almost every farm in the weald has one or more inclosed coppice on it, producing both timber and underwood. The growth of underwood is, in many cases, included in the letting of the farm, the timber, tellars, and standards, being reserved to the landlord, with power at every cutting of the underwood to save such young trees (usually called tellars or standards) as he may think fit. In other cases, where the estates are large, the coppices are retained in the hands of the landlord.

As is well known, where timber is encouraged in coppices, the underwood must diminish as the timber advances in growth; and it becomes a question, looking to profit alone, whether the timber or the underwood, or both together, should be promoted. This question is of course greatly affected by the position of the woods and the relative value of the timber and the underwood. Where the coppices are within moderate distance of the hop-growing districts, the underwood acquires additional value for hop poles. Well-grown underwood can also be turned to profit by conversion into hoops, for exportation to the West Indies, for sugar barrels. This latter conversion is carried on to a large extent. Planting for the increase of the underwood often takes place at each cutting, whereas the timber growth depends wholly on the native produce and is self-supporting. The growth of oak trees is much promoted by good draining, by open ditches, usually from 20 to 30 inches deep, which should be cleared out at each cutting of underwood.

A Norfolk landlord remarked some years ago to his agent (my uncle) that he could not understand how it happened that whilst he received a rental equal to 25s. or 30s. per acre from his Norfolk property, he only derived 10s. to 15s. from his Sussex farms. The answer to this was,

that if the landlord would look through his Sussex estate accounts for 20 or 30 years past, he would find that where he got 20s. for rent he had also received 20s. for timber, so that he was getting as much yearly profit from his Sussex property as he did from his land of better quality in Norfolk.

I propose to inquire into the following matters connected with the growth and management of self-sown woods.

1. The soil best adapted to the growth of oak.
2. The position of woods as affecting their growth.
3. The effect of the periodical cutting of underwoods upon the growth of trees.
4. Up to what age of the timber does it injure underwoods.
5. Pruning.
6. The general treatment of woods by thinning and clearing.

I would also inquire whether it is more profitable to grow underwood than timber.

1. THE SOIL BEST ADAPTED TO THE GROWTH OF OAK.

Oak will grow in almost any kind of clay, from the poorest and stiffest to a good deep loam. As the oak, in its earliest stages of growth, has a long tap root, a deep soil, free to a certain depth from rock, is necessary to its rapid development. Oak will grow with considerable luxuriance in a gravelly soil, but on arriving at a size fit to be called timber, it becomes what is termed shaky, and it will be found on felling to be little more than a bundle of laths, utterly unsuitable for the uses to which oak timber is generally put.

Oak trees grow most rapidly in a soil in which clay and sand are largely mixed together. The oak grows much more slowly upon a *very* stiff clay.

2. THE POSITION OF WOODS AS AFFECTING THEIR GROWTH.

There is no tree grown in England more sensitive to exposure to wind than the oak. The best and fastest growing woods are those in sheltered positions, well inland. Though the soil may be thoroughly suitable, an oak wood will not arrive at perfection without an effective protection from the enemy of all timber in this district, the wet south-west wind.

There is a tract of country in the south-east of Sussex, lying between Battle and Hailsham, the soil of which is well adapted to the growth of oak, but which, from its nearness to the sea—about 10 miles as the crow flies—fails to produce, except in very deep narrow gills, other than short stumpy trees with bushy boughs, evidently thrown out as a protection against the south-west wind. These trees produce knotty and unsaleable timber. The district before-mentioned, and known as the Forest Range, in which the natural crop is birch and heath, is exceedingly unproductive until planted with larch or Scotch fir, as has been done in various portions of St. Leonard's Forest, particularly that portion situated in the parish of Worth.

The few oaks growing amongst the scrubby birch are very similar to those described above, except that owing to the distance from the sea, they do not exhibit the same amount of bushiness on the side towards the prevalent wind.

About 30 or 35 years ago the planting in St. Leonard's Forest was begun with larch and oak, the proportion being about 5 of larch to 1 of oak. Since the larch were 7 or 8 years old, they have been gradually thinned out for hop-poles, &c., and, though in no case have they thoroughly disappeared, the land is now fairly planted with straight-grown silver-rinded tellars, which bid fair, in due time, to become a fine oak forest. This land is ordinary forest

land, upon the geological formation known as the Hastings sand district.

3. THE EFFECT OF THE PERIODICAL CUTTING OF UNDERWOODS UPON THE GROWTH OF TREES.

The periodical cutting of underwoods affects the growth of trees, as it affords the only opportunity of thinning woods; thus the thinnings are at longer intervals than is best perhaps for the growth of oak timber.

The custom, in the three counties of which I am speaking, is to cut the underwood at intervals of from 8 to 12 years. Underwood is usually sold by auction in November, and in the following spring the oak trees are inspected, and such thinning as is required is then done. If the timber only were considered, a shorter interval of, say 5 or 6 years, would be better, but as the underwood is an important portion of the profits, it is impossible to make the most of it until it becomes large enough for conversion into hop poles, hoops, &c.

4. UP TO WHAT AGE OF THE TIMBER DOES IT INJURE UNDERWOODS.

Supposing there is a full plant of tellars at any given fall, for the next two cuttings (say for 20 years), there will be little difference found in the value of the underwood, which averages from £8 to £10 per acre. The next three cuttings will be reduced, on an average, about one-half, and, afterwards, the periodical cutting will be sold for a very small sum, viz., £1 or £1 10s. per acre, which will not pay for rates, fencing, and ditching.

5. PRUNING.

This question was gone into fully in March last by Mr. MENZIES, in the discussion on Mr. WILLIAM BROWN'S Paper. I need hardly say that I agree entirely with Mr. MENZIES' views on the subject. Not only is pruning unnecessary,—for if thinning is done gradually, allowing the oak trees to draw each other up to such height as may be required, the lower branches will of themselves drop off,—but it is actually injurious, as every timber merchant or village carpenter knows. Moreover, the boughing of oak trees materially affects the value of the timber when felled, though the tree when pruned, may be only 20 or 30 years, and when cut, 150 years old.

When the boughs are thrown off by nature, as they are most perfectly, the bark under careful management gradually closes over the part from which the bough dropped, and it becomes impossible to define its former position; nor would any sign of it be found when the tree is cut; but should the tree be *pruned*, an unsound knot, or a sore in the tree, is at once formed, allowing the water to penetrate the trunk where the branch was cut off. This will rot, and a black, dead piece of wood will be found in the centre of the tree when it is cut. The bark will, no doubt, usually close over the wound made, but this will take some years, and before it is closed the mischief will be done; and, in old trees, it not unfrequently happens that the perfect closing over the wound by young wood causes a species of dry rot.

6. THE GENERAL TREATMENT OF WOODS BY THINNING AND CLEARING.

As I stated above, the time for thinning woods is when the underwood is cut. It is scarcely necessary to remark

how much the profitable growth of oak timber is affected by management, and a knowledge of the habit of the tree. The greater part of the timber of the weald is grown with underwood. The underwood is cut, on an average, once in 10 years. At each cutting, trees which have attained a good size, and show symptoms of diminished growth, are felled, and open spaces are thus obtained for a fresh crop. The same opportunity is taken for thinning the young tellars, and of saving such further young plants as have come up since the last cutting of the underwood,—that is, 10 years previously.

In thinning tellars and young trees, it is of the utmost importance that the leading trees should be left, and the inferior ones cut.

The oak is very impatient of exposure, and when once drawn up, from having been long left thick, great care is requisite in thinning, so that those left should continue in a growing condition. This is of so much importance, that cases are frequently seen where estates with a well-planted, thriving crop of timber have been ruined as regards the ultimate crop by injudicious overcrowding, and subsequent too rapid cutting, as well as by the selection for cutting of the leading trees, under the expectation that those left of an inferior growth will take their places and thrive. This never succeeds. The trees that have been thus separated from their companions and left exposed will not thrive for many years, if at all, and the most profitable course then is to clear off the whole of the crop.

After a wood has been cleared of a natural crop of oak in these counties, and the underwood has grown for a period of 10 years, it will, generally, be found at the next cutting that a good crop of self-sown oak tellars or standards on low stools is fairly scattered over the ground. The tellars are usually marked with paint, before the underwood is

sold, and are excepted from sale. At this first cutting the young oak trees will be about the same height as the underwood, and if the underwood is fairly good, and the tellars are well marked beforehand, the chances are that it will be unnecessary to thin the tellars at all more than by a woodman going round and chopping down with a hatchet any inferior trees. During the next five or six cuttings the real work of thinning must be executed.

This must be done gradually, although more severely where profit is desired to be made from underwood than where timber alone is the object of profit. The inferior and unlikely looking trees are, of course, selected, care being taken to leave the outsides of the coppices, and particularly the south-west side, thicker than the interior. It is impossible to draw a hard and fast line as to the ultimate distance apart at which oak trees should be set out, as so much depends on the vigour with which the trees grow, the size they may be expected to attain in the locality, and the object with which they are grown.

For the ultimate crop, the trees should stand from 20 to 30 feet apart.

The great aim of every forester should be to keep the trees thick enough to draw each other up to the height required, so as to have a clear stem of from 20 to 40 feet, as the case may be, and so gradually thin them as not to abruptly admit the wind, and thus cause them to be checked in growth. Any checking of growth is speedily detected by the throwing out of a quantity of rushy boughs.

If the trees have been properly managed, very little further thinning will be required until their clearing, unless the timber is left for a longer period than 100 years for large shipbuilding. It will, however, be necessary to go round each time the underwood is cut, and mark any tree that is evidently overpowered by the others,—in fact what is termed

an "underling ;"—but beyond this any disturbance of the general head of the wood is injurious.

When it becomes apparent that the majority of the trees in a wood have finished growing profitably, it is entirely cleared ; though, in so doing, some trees may be cut that still grow, as it is certain that, should the trees which have finished growing be picked out for cutting and the growing timber left standing, that left standing will be killed or very much retarded in growth.

I was over a wood some days ago where a solicitor was said to have marked the timber for falling : I remembered seeing the wood some 6 years before as having a fine growing healthy plant of timber, perhaps 100 years old, and which had up to that time been well thinned and was in a good state. This gentleman entered the wood 3 years ago, and regularly marked each alternate tree. The result is, the timber left standing has become unthrifty, and will either die or be nearly bare poles covered with a rushy growth ; and after all he has not encouraged the underwood, nor given the land a chance of throwing up a fresh crop of oak trees.

I now come to the question of profit,—whether timber or underwood pays best, taking a certain period of time, say 100 years.

Assume an acre of underwood of a fair average description in Kent, Surrey, or Sussex, no oak trees being allowed to be grown upon it, but kept entirely for underwood.

I will suppose that it has a good set of stems upon it. This underwood is worth, to sell, upon an average, £10 per acre at 10 years' growth ; and it may be assumed, for the purpose of rental value, that underwood selling for £10 or £12 per acre, is worth the same number of shillings rent ; this will be found to be a close approximation if worked out.

This acre of woodland will, therefore, produce a rent of

10s. per annum, and, with occasional filling up, will go on producing the same description of underwood for the 100 years.

Take, secondly, an acre of woodland under similar conditions with regard to underwood, but allow tellars to grow upon it; there will be found little or no difference in the value of the underwood for the first 20 years. During the next 40 years the underwood will have diminished in value; but the trees which have been cut in the course of thinning after 20 years will have more than made up any loss in the value of the underwood in this period. In fact, the produce is much more than enough to make up the loss of profit from underwood. For the remainder of the 100 years the underwood will pay very little, and the thinnings will not produce more than enough to pay expenses.

In the foregoing observations I have assumed that underwood sold at £10 per acre is worth a rental of 10s., and that for 60 years the underwood and tellar thinnings together will produce fully 10s. per acre. From the latter period and up to 100 years, when I assume the timber will be fit for falling, little or no revenue will be derived. The rental of 10s. per annum, accumulated for 40 years at 4 per cent., gives, in round figures, £50 per acre.

I will now give you instances of several acres of timber at various ages, to show that young oak trees are worth at the periods mentioned, larger sums than £50 per acre.

Timber on 1 acre of woodland at Hartswood, Surrey. Supposed age under 100 years. Measured February 1874:—

73 oak trees, 885 ft., at 120s. per load	£	s.	d.
of 50 ft.	106	4	0
2 tellars	0	5	0
	£106	9	0

*Timber on 1 acre of woodland at Hartswood, Surrey.
Known age 65 years. Measured January 1874 :—*

	£	s.	d.
67 oak trees, 910 ft., at 120s. per load	109	4	0

*Timber on $\frac{1}{2}$ an acre of woodland at Hartswood, Surrey.
Known age 33 years. January 1874 :—*

	£	s.	d.
39 oak trees, 200 ft., at 120s. per load	24	0	0
11 tellars	1	11	0
	£25	11	0

This is equal to £50 per acre.

*The timber standing on 4a. 3r. 29p., part of Crabbett Estate
(supposed age 100 years), was measured and valued in January
1867, with the following result :—*

	£	s.	d.
359 oak trees, 3,540 ft., at 120s.			
per load	424	16	0
20 tellars	2	7	0
	£427	3	0

Equal to £85 per acre.

This wood was again valued in December 1873, with the following result :—

321 oak trees, 4,471 ft., at 120s.	£	s.	d.
per load	537	10	0
5 tellars	2	7	0
	£539	17	0

Equal to £110 per acre.

The timber standing on 3a. 2r. 16p., also part of Crabbett Estate (supposed age 70 years), was valued in the spring of 1858 with the following result :—

166 oak trees, 1,310 ft., at 120s.	£	s.	d.
per load	157	4	0
65 tellars	6	0	0
	£163	4	0

Equal to £45 per acre.

This wood was again valued in December 1873 with the following result :—

205 oak trees, 2,842 ft., at 120s.	£	s.	d.
per load	341	0	0
17 tellars	2	16	0
	£343	16	0

Equal to £100 per acre.

The following is an instance of a wood of 4 acres near Reigate, which was planted in 1830 with oak and other trees. I have no record of any thinnings prior to 1866. In April 1866, 28 oak trees, containing 111 feet, and 208 tellars, were cut and sold for £42. In April 1872, 39 oak trees, containing 216 feet, were cut and sold for £21.

This wood was sold, and the timber on it valued very accurately, in 1873. There were 375 oak trees, containing 2,600 feet of timber, which, at £6 per load, gives nearly £80 per acre. The above sum of £80 per acre gives a rental of 15s. per acre at 4 per cent., and beyond that, of course, is the sum of money received for the thinnings. In 1873, 70 oak trees were cut which were valued at £40. The trees in this wood will not require much more thinning.

The following instance is one kindly supplied by the late Mr. W. STENNING, of East Grinstead.

1858, May.—*Standing in 16 acre wood.*

6 oak, 20 ft. and upwards	£	s.	d.
130 ft., at £6 10s. per load	.	16	18 0
48 oak, 10 ft. to 19 ft.			
547 ft., at £5 10s. ,, .	.	60	3 4
171 oak, under 10 ft.			
1,084 ft., at £4 10s. ,, .	.	95	3 2
6 ash, 18 ft.	.	1	4 0
351 tellars (1s. and upwards)	.	30	12 0
		£204	0 6

1868, April.—*Marked for sale, and subsequently cut down.*

	£	s.	d.
1 oak, 43 ft., at £6 10s. per load	42	15	5
11 oak, 20 ft. to 39 ft. .			
286 ft., at £6 10s. ,,			
91 oak, 10 ft. to 19 ft.			
1,236 ft., at £5 15s. ,, .	142	0	9
179 oak, under 10 ft.			
910 ft., at £5 ,, .	91	0	0
4 ash, 33 ft., at 1s. 6d. . . .	2	9	6
85 tellars	6	10	0
	£284	15	8

1868, May.—*Standing.*

	£	s.	d.
180 oak, 804 ft.	81	13	4
529 tellars (1s. and upwards) . .	36	3	0
16 ash, 46 ft.	3	9	0
	121	5	4
Sold as above	284	15	8
	£406	1	0

The underwood produced £9 per acre.

You will observe that I have put the timber at one uniform price. I have done so to enable you to compare oak timber at different periods of its growth.

It remains only for me to observe that it is, I think, a fact, that the oak growing districts in which underwood and timber are grown together, show a much larger profit, on an average of 100 years, than it is possible for oak timber

or underwood to produce when grown separately, as during the earlier periods of growth, underwood pays an income when the land planted with oaks pays nothing.

In this Paper I have endeavoured to give you some facts which may be of interest to you. My own experience is limited ; but I have derived some of the information given, from persons who have had a larger experience than myself.

Mr. JOHN CLUTTON (Past President) said that he should like to add a few words by way of supplement to the Paper just read. His friend Mr. CUMBERBATCH, the Deputy-Surveyor of the New Forest, and also of the Alice Holt and Bere Woods, and Sir JAMES CAMPBELL, the Deputy-Surveyor of Dean Forest, had kindly sent him memoranda, giving the number and admeasurements of oak trees standing on several acres of land in the forests and woodlands under their charge. It was not now his intention to discuss the Paper, as he hoped to have another opportunity of doing so. In the two documents sent to him the number and admeasurements only were given. He had added, for the sake of completeness, a column of values, and in doing so, had thought it better to apply an uniform price to the whole of the young trees, namely £6 per load. The trees were planted between 1812 and 1816, and were therefore from 57 to 61 years old. The old timber was put at its saleable value. The following were the memoranda to which he had alluded :—

NEW FOREST. Planted 1813.

Aldridge Hill.

1st acre,	75	oak trees,	742	ft.,	value	£90.
2nd	„	79	„	559	„	67.
3rd	„	77	„	641	„	78.
4th	„	72	„	683	„	84.

ALICE HOLT Woods. Planted 1813.

Lodge Inclosure.

1st acre, 40 trees, 837 ft., value £100.

Goose Green Inclosure.

2nd acre, 50 oak trees, 812 ft., value £97.

BERE Woods. Planted 1816.

1st acre, 54 oak trees, 771 ft., value £93.

2nd „ 70 „ 618 „ „ 74.

DEAN FOREST. Planted 1814.

Blakeney Hill, South.

1st acre, 72 oak trees, 720 ft., value £87.

Bromley Plantation. 1812.

2nd acre, 67 oak trees, 700 ft., value £84.

Nag's Head Plantation. 1814.

3rd acre, 77 oak trees, 425 ft., value £51.

IN HIGHWOOD Woods. Age unknown.

1st acre, 30 oak trees, 1,528 ft., at £7 — £214.

2nd „ 50 „ 1,480 „ „ £7 — 207.

He would now give particulars of a few acres, measured in Richmond Park, under his own directions.

Upper Pond Plantation. Planted 1824.

60 oak trees, 672 ft., at £6 — £81.

Kingston Hill, West Plantation. Planted 1826.

46 oak trees, 628 ft., at £6 — £75.

Isabella Plantation. Planted 1831.

68 oak trees, 450 ft., at £6 — £54.

Isabella Plantation. Planted 1845.

110 oak trees, 406 ft., at £6 — £49.

These trees, he observed, were from 28 to 49 years of age.

He desired to call the attention of the Members to a curious fact shown by the papers above given. In Lodge Inclosure, some few years ago, a portion of the plantation was thinned very hard to look park-like, and it would be seen that 40 trees on one acre have a larger quantity of timber in them than nearly double the number of trees on other acres.

With reference to the wood of 4 acres mentioned in the Paper read by his nephew, he (Mr. JOHN CLUTTON) might state that the wood was planted in the usual way, with from 2,000 to 3,000 trees per acre. Members would observe that now, at 43 years of age, there were only 60 trees per acre of the value, at £6 per load, of £80 per acre,—certainly a remarkable growth. It happened so seldom that any correct record could be obtained of the exact age of trees requiring 100 years or upwards to attain a marketable value, that he thought it would be interesting to have a record of trees of which the ages were well known; and it was seldom, in the case of private woods, that any records of the kind were kept, as the trees were frequently self-sown.

[Mr. CLUTTON here produced some specimens lent to him by the Honourable JAMES HOWARD, the Commissioner in charge of H.M. Woods and Forests, showing the pernicious results of boughing trees. Two specimens were shown of trees the boughs of which had been cut off at an early age, and where the wound had been covered by a new growth; but the base of the bough was so much decayed as to make the tree quite unsound. A specimen was also produced of an old horn which had been left on the tree, the base of which was quite sound and hard; in another specimen from the same tree, where the horn had been cut off, the base was quite rotten.]

He then observed, with regard to trees grown from low stools, that it was well known to foresters in the south of England that trees so grown made a larger amount of timber, in a given period, than trees grown from acorns. His father taught him this nearly half a century ago ; and, if a tellar were unthrifty, it was his practice to have it cut off, and it would make much more rapid growth than if left uncut. In the first Report of the Commissioners of H.M. Woods and Forests, in 1812, it was stated, as to trees grown from stools, as follows :—

“ On the other hand there was the positive testimony of many persons of great information and experience, who mentioned instances within their own knowledge of large sound timber, fit in all respects for the use of the navy, which had clearly grown from the stumps of former oaks.

* * * *

further,

“ In a treatise on Planting and the Management of Woods, by SAMUEL HAYES, Esq., a member of the Committee of Agriculture, of the Dublin Society, it is stated, that it is now incontestably proved that some of the finest trees ever produced have risen from old stools, and several instances are mentioned in his work.

“ Mr. WICKENS says there are many hundreds of fine trees now in Lord FITZWILLIAM’s Park, at Wentworth Castle, which have grown from stools.

“ Nothing, however, was more convincing to the Surveyor-General than the circumstances of a wood in the New Forest, called North Bentley Coppice, in which, on personal observation in the year 1810, he found that a large proportion of the trees, of various sizes, with which that wood is abundantly stocked, had manifestly and unquestionably sprung from stools, and that such trees were in a state of as great vigour and obvious increase as those near them which had grown from the acorn.”

Mr. C. M. BIDWELL (Member) said that he had much pleasure in proposing a vote of thanks to the author of the Paper, which was a very excellent and useful contribution to the *Transactions*, and had been well supplemented by the subsequent remarks of Mr. JOHN CLUTTON. The specimens exhibited afforded a very instructive lesson in the management of oak timber, and gave ocular proof of the evil results of injudicious pruning. All who were interested in the cultivation of oak timber would feel how much they were indebted to Mr. CLUTTON for his Paper. In the part of the country (Cambridgeshire) where he resided, the oak was very scarce, although, from remains found buried in the fens, some of them measuring 60 feet in the stem, the tree would appear to have flourished in the country many centuries ago, and its virtual disappearance was, he thought, to be regretted.

Mr. D. WATNEY (Member) begged to second the vote of thanks. One fact he said was worth any number of theories, and such practical statistics as had been given by the author of the Paper and Mr. JOHN CLUTTON, were of the utmost value, since nothing was more difficult than to obtain reliable information as to the planting and management of woods dating back 40 or 50 years. He hoped that some gentleman, before the discussion closed, would produce statistics as to the actual diminution in money value of the periodical cuttings of underwood, as the timber increased in value. The author of the Paper had said that the value of the underwood was but very small after timber had attained the age of 60 years until its cutting at the age of 100 years. That they must all admit; but perhaps the author forgot to take into account the fact that for the next 20 years after the cutting of the timber, the underwood would not be of much value. If the woods

were treated properly, they would then be replanted, and for the first two cuttings the value of the underwood would be exceedingly small. In Sussex and the other districts spoken of, there could be no doubt that oak timber grew much more rapidly and was more valuable than in other parts of England, and timber was, in those districts, a most important element in the value of estates. It was to be regretted that it was so badly managed as he had found it to be in his own experience. It was common to find small farms, say of 50 or 100 acres, where the tenants cut the underwood as they pleased, without any regard to saving tellars for timber, whilst the timber was set out for repairs by some one without practical knowledge of the work, and, as a consequence, when the estate changed hands by death or sale, and a fresh owner came in, the timber was in such a state that it was a matter of great difficulty to know what to do with it, as it had not been thinned at the proper period, and had grown together. That great loss resulted, was shown by the statistics given by Mr. JOHN CLUTTON relative to thinning.

There was a saying that "underwood buys the horse, while timber buys the saddle." That might be the case in hop districts, where the poles of chestnut and ash grew as underwood, and formed valuable crops; but, even in those districts, very little planting was done when trees were cut. It seemed to be the last thought of landlords (unless they had good agents) to fill up the spaces with underwood plants. Their neglect in this respect might be owing to two reasons—first, the landlord might be anxious to get the money for the timber into his pocket; and, secondly, he might not have the patience to wait the length of time required for the plants to arrive at a condition to yield any profit. An additional discourage-

ment to planting was the fact that if it were not done by a qualified person, or if the plants were not properly attended to for the first 10 years, many would die and the others would give a very unsatisfactory return.

Mr. W. J. BEADEL (Member) said that as Mr. WATNEY was to read a Paper at the next Meeting on the subject under discussion, and as the two Papers could be more advantageously discussed together, he would confine his observations on the present occasion within very brief limits. Much as he appreciated Mr. R. W. CLUTTON's Paper, and the succeeding observations which fell from their Past President, he (Mr. BEADEL) would like further information as to the growth of timber on stools. He had never lived in Sussex or Kent; but he had had some experience in both those counties, and must state, though with some diffidence after the opinions which had been expressed, that he had never known an instance in which timber grown on stools was better than that grown from the natural seed. There seemed to be no better *primâ-facie* reasons for supposing that the growth of trees would be improved by cutting off limbs than that of the human body by similar treatment. He hoped that the objection which he had raised with reference to this point, would elicit from some of the Members information as to the relative merits of the two methods.

On the motion of Mr. WATNEY, the discussion was then adjourned.

TIMBER.

By DANIEL WATNEY, MEMBER.

*Read at the Ordinary General Meeting of the INSTITUTION OF SURVEYORS,
March 2nd, 1874.*

EDWARD NORTON CLIFTON, PRESIDENT, IN THE CHAIR.

WHAT is timber? Timber trees are those which serve for the building or reparation of houses, such as oak, ash, and elm, of the age of 20 years and upwards; but by special custom, in particular parts of the country, other trees not usually considered timber, are deemed to be such. So beech is timber in Bucks, Gloucestershire, and some places in Hampshire, Bedfordshire, and Surrey. Again, birch is timber in Yorkshire and Cumberland; and chiefly, one would suppose, because it is indigenous to the soil. So, by different legal decisions, cherry, aspen, willow, holly, horse-chestnut, lime, yew, crab, hornbeam, walnut, blackthorn, and whitethorn, have been held to be timber by special custom in certain places; while pollard timber trees have been held to be timber if their bodies are sound; and, at the Suffolk Summer Assizes in 1803, the value of pollards was recovered as timber and timberlike trees.

At what period does a sapling or a tellar become a timber tree? I consider that it becomes timber when it has attained the quarter girt of 6 inches under the bark; although, in some districts, it is asserted that a beech is not a timber tree until it contains 10 feet.

In the neighbourhood of Guildford, some valuers measure

oak saplings as timber, down to 1 foot cube measure, such saplings not girting 6 inches. This I have always objected to, but I hope Members will give their views upon the subject, for I have been unable to find any dictum upon it.

In *Smythe v. Smythe*, before Lord ELDON, in 1818, the practical question was, whether a tenant for life, not impeachable of legal waste, was doing equitable waste by cutting oak trees, of which the contents were less than 9 cubical feet, which were said to be unfit for timber, and the removal of which would be ruinous to the saplings left. Lord ELDON refused the injunction, and, in his judgment, observed, "If the trees are so far advanced as to become timber, the tenant for life may cut them down, though they are in a state to thrive, and though cutting them down would injure the saplings. It is not sufficient to state that this is thriving wood; it must be thriving wood not fit for the purposes of timber. I cannot determine whether a tree, measuring less than 9 cubic feet, is or is not fit for purposes of timber."

RIGHTS IN TIMBER.

We will now consider this question, and I cannot do better than quote the opinion of an eminent authority:—

"An owner of lands upon which trees stand may deal with the trees as he pleases—If the lands are of freehold tenure, if his interest is a fee-simple or a fee-tail, if it is in possession, if it is not liable to be defeated or put an end to by any contingency, if his enjoyment is not shared by any co-owner as joint tenant or tenant in common, if he is in personal occupation, if he is not subject to any charge or incumbrance, or mortgage, or to any agreement for a lease, or to any rights for estovers (in common or otherwise), or to

any forestal rights of the Crown or its grantees, and if the trees do not assist to keep up the bank of a stream in which other persons are interested ; but unless his position with reference to his lands and the trees upon it, answers precisely to this description, he will find that his rights are more or less limited."

Timber when standing is part of the inheritance, but when it is severed, either by the act of God or by tempest, or by a trespasser, and by wrong, it belongs to him who has the first estate of inheritance, whether in fee or in tail, who may bring trover for it, and this was so decided upon the occasion of the great windfall of timber on the Welbeck estate, in Nottinghamshire, in the year 1724.

RIGHTS OF THE TENANT FOR LIFE AS BETWEEN HIMSELF AND THE REMAINDER-MAN.

A tenant for life has but a special interest in the trees growing on the land so long as they are annexed to it, but if he or any one else severs them from the land this interest is determined, and they become the property of the owner of the inheritance.

A tenant for life may cut down timber at seasonable times, for the reparation of houses and fences ; but he cannot cut down timber to build new houses, or to repair those that he himself has improperly suffered to fall into decay ; and where he cuts down more timber than is necessary, it is waste, though he asserts that he cut it down to employ it on future repairs. The Master of the Rolls, in 1815, decided in the case of *Gower v. Eyre*, that a tenant for life, impeachable of waste, but entitled to cut timber for repairs, must use the specific timber cut ; and that if he sells it, and applies the produce in the repairs, he may be compelled to account for and pay its value to the remainder-man. But

the words, "without impeachment of waste," give to the tenant for life the right to fell timber, and also the property of all timber trees felled or blown down, and also all timber parcel of a building blown down. The power such a tenant for life, without impeachment of waste, has over his estate with respect to cutting down timber, must be exercised during his life, and cannot be delegated to any other person, so as to enable such person to execute it after his death; but although a tenant for life, without impeachment of waste, might legally cut down every stick of timber upon his estate, the Court of Chancery will prevent his cutting any trees "planted or left standing for ornament or shelter," whether timber trees or not, and any saplings or young trees not fit to be felled, and, in fact, from doing any other kind of waste which would be destruction,—and this is termed "equitable waste."

In *Wombwell v. Lady Charlotte Belasyse*, in 1825, Lord ELDON, in his judgment, said, "The question is not whether the timber is or is not ornamental; but the fact to be determined is, whether it was planted for ornament, or if not originally planted for ornament, was, as we express it, left standing for ornament by some person having the absolute power of disposition.

"If such a proprietor had even the bad taste to plant or leave standing a couple of yew trees cut in the shape of peacocks, I do not shrink from what I laid down in the *Marquis of Downshire v. Lady Sandys*, that they must be protected until some person, having the absolute power of disposition with more correct taste, comes into possession; and this doctrine applies in the same manner to a pleasant ride, although at a distance of 2 miles from the mansion house; for I do not agree that a mere tenant for life, coming into possession, can vary the estate."

In the case of *Vincent v. Spicer*, decided in 1856, the

estate of the tenant for life was thus described ; “ Without impeachment for or of any manner of waste, save and except spoil or destruction, or voluntary or permissive waste, or suffering houses or buildings to go into decay, and in not repairing the same.” Upon this the following declaration was made by the court, viz., that the defendant, as assignee of the interest of the tenant for life, is entitled to cut all such timber and wood not planted or left standing for protection or shelter of the mansion house, or for the ornament of the house, or growing in lines or vistas or otherwise for the ornament of the house, or of the gardens, park or pleasure grounds thereunto belonging, as an owner in fee-simple, having regard to his present interest, and also to the permanent advantage of the estate, might cut in a due course of management.

One of the most important recent cases was that of *Ford v. Tynte*, fully argued before the Lords Justices in 1864. I was instructed by the assignees of the tenant for life to mark and sell all such trees on the Halswell estate, near Bridgewater, in Somersetshire, as could be cut, having due regard to “ ornamental timber, and that planted or left standing for ornament or shelter.”

Accordingly, I marked 2,900 trees in the woods and plantations surrounding the park (but none in the park itself), and in the other woods and on the estate generally.

The remainder-man objected to this, and the Lords Justices directed an inquiry in these terms, viz. :—“ Whether certain woods and other particular trees which had been marked for cutting, or any and which of them were or was, or have or has been, planted or left standing by any owner in fee or in tail of the Halswell estate, or any part thereof for the ornament or shelter of the mansion house on the said estate, or of the gardens, park, or pleasure grounds thereto belonging, or of the road or roads, path or paths.

leading thereto, or for the purpose of intercepting the view of any object or objects intended to be kept out of sight from the said mansion house, gardens, and park, or pleasure grounds, or any part thereof; and in case it shall be so found as to the said woods or any or either of them, then that further inquiry should be made whether the trees therein have ordinarily or otherwise, and under what circumstances, been cut for repairs or for sale, and what estate or interest the person or persons by whom or by whose order or direction the same are so cut had in the Halswell estate at the time of the cutting thereof, and whether the trees in the said woods and the said other trees which have been marked for cutting, or any or either and which of such trees injure or impede the growth of any other trees adjoining or near thereto which are of so much importance to the purposes of ornament or shelter to the said mansion house, gardens, park, or pleasure grounds as that the removal of the trees so marked for cutting is essential to the purposes of ornament or shelter."

The result was that I sold by auction 1,720 trees, which realized £1,650, that the remainder-man bought one splendid tree, at 50 guineas, which was not legally "ornamental," but which possessed family associations, and a compromise was effected as to the remaining 1,179 trees which were marked, and which were worth about £2,360; and as the subject was allowed to drop, the inquiry was never worked out.

It seems that the court will not sanction the cutting of trees planted or left standing for ornament for the mere reason that they are in a decaying state.

RIGHTS AS BETWEEN LANDLORD AND TENANT.

The general property in trees is in the landlord, and that in underwood in the tenant; but it was expressly decided in

the case of *Mervyn v. Lyds*, in 1553, that a lease of land includes the trees, unless they are specifically reserved. The law then laid down by the court was as follows :—

“The woods and trees are parcel of a lease, and pass to the lessee as well as the land, if they are not excepted by it; and, in proof of this, all fruits and profits arising from the fruit trees shall be the lessee’s, and the shadow, and also the branches and loppings for fuel, or inclosure of fences; and although it would be a good bar in waste for the lessee to say that his lessor, who is the plaintiff, did the waste, yet if the lessor cut down the trees without the license or against the will of the lessee, an action of trespass will lie against him by the lessee.”

Subsequent decisions have confirmed and extended this dictum; and, unless in a lease for years, or in an agreement from year to year, the timber and timber-like trees are expressly reserved to the lessor, the lessee is entitled to enjoy the shade, shelter, and fruit of the trees, to cut down and appropriate all such of them as are not timber, unless planted or left standing for ornament, or unless affording permanent shelter or shade, to lop those which are timber for necessary repairs of hedges and husbandry implements, and for fuel, and if necessary to cut down the timber trees themselves for repairs to houses, and principal buildings; but the repairs for which alone timber trees may be cut, are such present necessary repairs of existing houses, buildings, fences or implements, as it is the lessee’s duty to do; and any timber cut by the lessee for repairs must be at once specifically used in the work, and not sold for money or exchanged for other or seasoned timber. Again, the lessee must fell such trees only as are proper for the purpose, and apply them accordingly. These rights are technically known as the tenant’s “botes.”

Again, the bodies of dead timber trees or dotards—even

if all timber trees are reserved to the lessor—are when blown down by tempest, or cut by the lessor, absolutely the property of the lessee, as was decided by *Herlakenden's* case in 1589, and later by the *Countess of Cumberland's* case; and it is presumed the lessee may fell them himself if they are obviously dead; for it is laid down that the lessee may not cut timber trees for firewood if there is dead wood enough on the premises, which seems to make all dead wood his own; and even if all timber trees are reserved to the lessor, so that he may come on the land to cut them, yet if one which he cuts proves to have been decayed at the date of the lease, it may be claimed by the lessee; but whether it could be so claimed if proved to have become decayed since the lease was granted, seems to be a point undecided.

The lessee has no right to windfalls, if they are timber trees and sound; but he may, perhaps, have a right to a windfall of trees which never were timber, notwithstanding they are sound, because he might cut them himself without being chargeable with waste.

The right of a lessee to cut and appropriate trees which are not timber, if they do not serve for shelter or shade, was decided in the recent case of *Phillipps v. Smith*, in 1845, in favour of a tenant, from year to year, of a farm in Leicestershire, who cut down large pollard willows, standing by the side of a brook, of the value of £64; and this was held not to be waste, and therefore not to be farming contrary to the common law, which would make the tenant liable to an action of farming in a bad and untenantlike manner.

But if trees are excepted from a lease, it will be trespass for the lessee to touch them, as he has no manner of interest in them; but, it should be noted, that an exception of trees makes it trespass, and not waste, in the lessee to fell them or lop them; and this is important, because a right of re-entry, or of action for breach of covenant, is sometimes given upon the commission of waste by a lessee, as in the case of

Goodright v. Vivian, in 1807, which was an action for ejectment in Cornwall for forfeiture, the lessee having sold the wood in a coppice, and included some maiden timber trees which were cut contrary to a proviso in the lease, which excepted all trees of oak, ash, and elm growing, or to grow, with the condition that, if the lessee should commit waste in or upon the demised premises, the lessor might re-enter;—but the full court, upon argument, held that waste could only be committed of the thing demised, and that the trees being excepted were not demised, and that no forfeiture within the provisions of the lease could be incurred by felling them.

Lord COKE says that waste must be of the value of 40 pence at the least to justify a complaint.

* A lessor, even when there is no reservation of timber trees, may support trespass against a third person for carrying them away after they have been felled; which shows that although a lessee may cut them as “botes,” yet he may not cut them for sale.

Such extensive rights as these possessed by a lessee, ought obviously to be abridged, by reserving “all timber, timberlike and other trees, tellars, saplings, and the bodies of pollards, standing, being, or growing, or which at any time during the demise, shall stand, grow, or be upon the demised premises, with power for the lessor to enter, cut down, convert, or carry away the same.” The tenant should also be bound to give 14 days’ notice of his intention to cut underwood, so that the lessor may mark such tellars and saplings as he may select to stand, and which, otherwise, the tenant might possibly cut with the underwood.

In *Whilster v. Parlow*, it was decided that “this difference exists betwixt the exception of wood and underwood and the exception of all timber trees; for in the first the soil itself of the wood and underwood and what is known by that name is excepted; but in the last case no soil is

excepted, but only so much as is sufficient for the vegetature and growing of the trees."

Where trees are excepted from a lease, the lessor may sell them, as was decided by Lord COKE in *Stamp v. Clinton*, commonly known as *Liford's Case*, where the lessee for life brought an action against the reversioner. The lease had excepted oaks, ashes and elms of a certain age, and the reversioner's agent came on the land to show some of these trees to an intending purchaser, and for this supposed trespass the action was brought.

In deciding against the plaintiff, the court laid down the following proposition:—"When the lessor excepted the trees, and afterwards had an intention to sell them, the law gave him, and them who would buy, power as incident to the exception to enter and show the trees to those who would have them; for without sight none would buy, and without entry they could not see them." So that, according to the authority of this case, wherever trees are excepted from a demise, there is, by implication, a right in the lessor to enter the land and cut the trees; although if he leaves them on the land for an unreasonable time he does more than the law authorizes him to do.

In the case of *Hewitt v. Sir C. Isham, Bart.*, in 1851, there was a reservation of trees in a demise not under seal, and this was held to amount to a license to cut them, to saw them up on the land, and to carry them away. The reservation was in these words—"All the hedges, trees, thorn bushes, fences with the lop and top, are reserved to the landlord;" and the fact was that the lessor had not only entered and cut the trees, but had dug and used saw-pits on the demised lands. This he was held justified in doing, if he did not leave the trees on the land for an unreasonable time, and he was allowed to plead "leave and license" to an action for trespass.

It was said that if the demise had been by deed the

reservation would have been construed as a grant, and have implied the right of going on the land to cut and carry away the trees. For this there would have been ample authority, not only in the maxim of law, but also in the words of Lord HOBART, who, in giving judgment in *Lord Darcy v. Askwith*, says, "If I grant or reserve woods, it implies a liberty to take and carry them away." Judge MAULE, in this case, directed the jury that the stipulation in the demise afforded evidence of leave and license, and the Court of Exchequer refused to set aside a verdict for the defendant. Care must be taken in sales of timber, that the buyers are bound to pay the tenants such damages (if any) as may be occasioned to their crops, fences, gates, or otherwise, by any wilful act of the purchasers or their servants, or by neglect either in removing the timber, or in allowing the same, or the lop, top, bark, or faggots to remain on the land an unreasonable time; for, otherwise, the tenant will have a remedy against the landlord, as in the case of *Williams v. Currie*, where the jury gave the plaintiff, who was tenant of 37 acres of grass land on which 100 trees were cut, the sum of £250 as damages to hedges, and the assumed value of the first and second crops of hay, and the court refused to grant a new trial—which was applied for—on the ground of excessive damages.

TIMBER ON COPYHOLDS.

As to trees growing on copyhold lands, the lord of the manor, being the owner of the soil, is also the owner of the timber trees thereon, and a copyholder, whether of inheritance, or for life, or for years, has no other interest in the trees than that given by special custom, nor, according to a decision of the Court of King's Bench in 1815, has he any right to cut trees for profit, or for purposes foreign to the incidence of his tenure without license from the lord.

In the absence of any particular custom, neither the lord without the consent of the tenant, nor the tenant without the license of the lord, can cut down timber.

The right of "botes" or "estovers," which by custom is exercised by copyholders upon their customary tenements, enables them to cut timber and other trees for special purposes, and a copyholder is frequently allowed by the custom of the manor to cut down timber for repairs; but in such case if he does not make immediate use of the timber the lord will have sufficient grounds for an action of waste, or of forfeiture of the whole of the copyhold tenement on which the waste has been committed.

It would appear that when the copyholder may cut timber for repairs, he may not sell the timber itself, even though he exchange it for other or seasoned and more suitable timber; but, on the other hand, he may sell the lops, tops, and bark, towards defraying the charges of reparation.

In some manors, the lord is entitled to the whole of the timber, and in various manors the lord allows the tenant on enfranchisement, or on sale of the timber, one-half, two-thirds, four-fifths, and in one case I have heard of, nine-tenths; probably in this last case as an inducement to the tenant to enfranchise.

If the tenant plants timber trees, which in course of time become timber, they are then the property of the lord and cannot be cut without his license, although they may be converted into pollards before they become timber, and in the lopping of pollards the lord has no interest; but I assume the tenant cannot plant to the injury of the land, that is, convert arable land into wood.

TIMBER ON WASTES.

The timber and other trees planted or growing on waste lands are the absolute property of the lord of the manor, and can be cut by him, unless they are protected by the ex-

istence of a right of common of estovers. “Common of estovers” is defined as the right, by special custom of the manor, of taking from the woods or waste lands of another person a portion of his timber or underwood for use in the commoner’s tenement; and by BRACTON it is defined as “the right of mowing, lopping, digging, or cutting in another’s wood, forest, marsh, heath, quarry, or other waste ground to the extent of *such reasonable supplies* as might be useful for fuel, building fences, and other purposes of husbandry.”

Common of estovers comprises the right of taking wood for the following purposes:—

1. *House-bote*, which is of two kinds—the greater and the less—the “greater” being a liberty to fell timber for repairs and rebuilding houses after accidental destruction; and the “less” being a like liberty of taking tops and lops of pollards and other trees, shrubs, dead wood, and underwood for fuel in the commoner’s house.
2. *Plough-bote*, or the privilege of taking timber and other wood for repairing the waggons and implements used in the commoner’s husbandry.
3. *Hedge-bote*; or hay-bote, for repairing gates and fences, or making temporary inclosures in an open field when the corn is sown.

The right to a “common of pasture” does not appear to carry any right to have the trees preserved for the sake of shade or shelter for the cattle or sheep of the commoners, as the right is simply that of taking the herbage by the mouths of the cattle or sheep.

The lord of the manor may plant trees on the waste, and protect them by approvement or inclosure, and the commoners may not cut them down although their rights of

common may be injured thereby, but must bring an action for the injury, if any.

By the 99th section of 8 & 9 Vict., cap. 118, it is enacted that the timber trees and underwood standing and growing upon any land to be inclosed shall be allotted and pass with the land, the allottees paying the value of the same, as determined by the valuer.

MEASUREMENT OF STANDING TIMBER.

The method of measuring standing timber, is by taking the *quarter girt* of the tree at the height of 6 feet from the ground, and then making allowance for the fall between that height and the middle of the butt. Having ascertained the quarter girt, multiply its square in inches by the length of the tree in feet, then divide by 144 to bring the product into cubic feet. Thus a tree, measuring 36 inches quarter girt, and 27 feet long, contains 243 cubic feet.

$$\begin{array}{r}
 36 \\
 36 \\
 \hline
 216 \\
 108 \times \\
 \hline
 1296 \\
 27 \\
 \hline
 9072 \\
 2592 \\
 \hline
 144) 34992 (243 \text{ ft.} \\
 \underline{288} \\
 619 \\
 576 \\
 \hline
 432 \\
 432 \\
 \hline
 \end{array}$$

Timber tables have been privately printed from time to time by surveyors, but they are difficult to procure; so I have had some printed, and shall have much pleasure in giving copies to any Member of the Institution. These tables go up to 27 feet in length, and 36 inches in quarter girt, which is higher than any others I have seen, except "HOPPUS's," which are out of print, and I have adjusted them, so as to do away with many of the results in odd inches.

The timber rule with the sliding scale is commonly used, but the timber tables are far preferable, although (as the tables are limited) the rule is useful in case of very large timber, as it saves the trouble of calculation.

There is an apparent discrepancy in this method of calculating from quarter girt, as it does not give the true content of the tree; but I hope I may be able to give a lucid explanation.

A tree with a diameter of 17 inches, and 10 feet in length, will give the following results:—

The cubical content of the largest die square to be obtained out of such tree, will be	Ft.	In.
	10	0
The cubical content of the tree (assuming it to be round) will be .	15	9

The mean, therefore, between the die square and the circle will be nearly 13 feet, and the content by quarter girt is 12 feet 6 inches.

It is therefore clear that the quarter girt will give the content of a piece of round timber nearer the quantity such tree will hold, when hewn die square, than the true cubical content; and is therefore more just when the waste is taken into consideration. In fact the content by quarter girt is, as shown above, nearly a mean between the die squared timber and the true cubical content of the tree, and by this

means an impartial allowance is made between the buyer and the seller, as the content is not taken to the full extent because of the waste, neither according to the die square, because that which is cut off, though not so good as the other, is yet of some value.

So, out of 50 feet of timber in the round state, measured quarter girt, you will obtain about $33\frac{1}{2}$ feet cube of "scantling," cut die square, but out of the same 50 feet of timber, if sold as "squared oak," known as such in the English timber trade, and hewn as timber is prepared for H.M. Dockyards, you will get, by calliper measure, about an average of 75 feet.

The rate for hewing English oak timber for H.M. Dockyards is,—“The timber to be so hewn or squared that at each of the measuring places, the *pane* (that is, the portion of the tree hewn off with the axe) shall not be less than quarter the diameter of the piece.”

By the rule, a piece 12 inches calliper in diameter, would require a pane of 3 inches, so that the measurement by calliper, as compared with the string or strap, is as 75 to 50.

“Squared timber,” known as such in the trade, is simply hewn, but timber cut or hewn die square is known in the trade as “scantling.”

It is usual, in measuring standing timber, to allow from the actual quarter girt for the thickness of the bark, and 1 inch to a foot for oak and elm is the ordinary deduction; but in ash, beech, and most white woods, this is too much, and half the allowance made in oak and elm is usually adopted, although no exact rule can be laid down upon the subject.

In measuring timber, all branches measuring 6 inches quarter girt, after allowing for the bark, are timber; but in Kent the custom is to measure the spire only, while in other parts of the country there is a custom that the spire and

one limb only shall be measured ; and when it is considered how the tops of large trees are liable to break in falling, this latter custom is, in my opinion, a reasonable one.

Before leaving this subject, I must mention the leather straps with which the quarter girt is usually taken. They should be well stretched before being marked, and when they are not made out of old driving reins the best plan is to throw the strap over a beam in an out-house with a heavy weight to either end and so leave it for 3 or 4 months. I use straps which do *not* allow for bark, as being in my judgment most convenient, and I would here advert to a vicious practice in marking straps which do allow for bark, which I have found in common use, and which I reluctantly suppose is done because it is too much trouble to make the requisite calculations. They allow 1 inch, that is to say, an actual quarter girt of 7 inches is marked 6, and so an actual quarter girt of 24 inches is marked 23, whereas the former should be $6\frac{1}{2}$ and the latter 22.

It is impossible that any one can learn to measure standing timber from a Paper of this kind—there is no “royal road” to that end ; it is only to be acquired by experience and practice. But the system is much simplified of late years. Take, for example, the form given in a book published in 1824 for the measurement of timber :—

No. on each tree.	Qr. girt in inches.	Length of tree.	Contents in solid feet.	Value of each per foot.	Value of the body of each . .	Value of the head of each.	Value of each tree.	Bark at £8 per ton.
1	$15\frac{1}{2}$	32	53	4s.	£ s. d. 10 12 0	16s.	£ s. d. 11 8 0	—

and the same book gives a table for measuring standing timber, which shows “The altitude and diameter of any tree to the hundredth part of a foot, answering to every

tenth part of a degree observed by the theodolite from a station of 10, 20, or 30 feet distance." It is obvious that if this system were now practised it would take a week to measure as many trees as an experienced measurer could do easily in a day. In woods or parks and open lands, with an assistant to book, and two sets of men with poles and straps, a practised measurer can easily do 100 trees in an hour.

VALUE OF TIMBER.

So much depends on the situation and quality of timber, the cost of carriage, &c., that the following schedule of prices must be accepted with considerable caution, although it may prove a guide to young surveyors.

Standing Timber at quarter girt measure.

Oak, under 10 feet	80s. to 100s.	{ Per load of 50 ft.
„ 10 and under 20 feet	100s. „ 115s.	
„ 20 „ 30	115s. „ 130s.	„
„ 30 and upwards	130s. „ 150s.	„
Elm, under 20 feet	6d. „ 8d.	per foot.
„ 20 to 40	9d. „ 1s.	„
„ 40 and upwards	1s. 3d. „ 1s. 9d.	„
Ash	1s. 3d. „ 2s. 6d.	„
Beech	8d. „ 1s.	„
Larch	10d. „ 1s. 3d.	„
Scotch and spruce fir	4d. „ 8d.	„
Spanish chestnut	1s. 6d. „ 2s.	„
Horse	1s. 6d. „ 2s.	„
Lime	2s. „ 3s. 6d.	„
Sycamore	1s. 6d. „ 2s. 6d.	„

Poplar, abele or aspen .	6d. to 1s.	per foot.
Plane . . .	— 1s.	„
Birch . . .	— 1s.	„
Maple . . .	6d. „ 1s. 6d.	„
Walnut . . .	2s. „ 3s.	„
Yew . . .	— 2s.	„
Alder . . .	— 1s.	„
Cherry (wild) . .	8d. „ 1s.	„
Acacia . . .	— 1s.	„
Cedar . . .	— 2s.	„
Hornbeam . . .	— 2s.	„
Willow . . .	— 1s. 6d.	„
Box . . .	3s. „ 5s.	„
Holly . . .	2s. „ 4s.	„

One hears, frequently, of large prices being obtained; and Mr. BROWN and Mr. SEDGWICK stated here, on 24th March last, that beech timber was making from 13d. to 2s. per foot. I do not doubt the accuracy of that statement; but it must be remembered that the felling was done by the vendors, and we are not told whether or not the trees were drawn out of the woods by vendor or purchaser.

Again, a special local demand for certain woods influences the price at particular sales. An instance of this occurred at an auction sale which I held at Abergavenny in February 1864, when 827 trees (oak, ash, elm, &c.) realized £1,295 as against my valuation of £881; and a larch plantation of 40 years' growth, and containing 24 acres, on the same day realized, in six lots, £1,145 or £47 10s. per acre as against my valuation of £25 per acre. The reason of this difference was that the coal and iron trades were unusually active, and there was no "pit wood" left, so orders had been given to the timber merchants which they were bound to execute;

besides, as a canal ran through the estate and at the foot of the larch plantation, the "pit wood" was taken to both coal and iron pits in the neighbourhood at very trifling expense.

The bark of trees is valuable for tanning purposes, although I believe that it does not pay to use any other than oak bark.

A load of oak timber will, on the average, in Sussex, Herefordshire, &c., produce about 8 to 9 cwts. of bark; and in Norfolk, and the adjacent counties, only about 6 to 7 cwts.; but, of course, so much depends on whether the trees are grown in hedgerows with short bodies and large tops, or in woods where they are drawn up and have but few limbs or boughs. Again, the bark of an oak grown in a wood, and having the protection and warmth of other trees, is not much above half the thickness of the bark of an oak grown singly, and exposed to wind and weather.

TIMBER AND OTHER TREES, AND THE USES TO WHICH THEY ARE GENERALLY APPROPRIATED.

The oak stands pre-eminent among all British timber trees, as well for utility and value, as for its majestic appearance. It provided for so many centuries the "wooden walls of old England," which established our naval supremacy in the world, and gave us our present proud position as a nation; but now the "navy contracts," which, till within the last 12 years, absorbed annually about 20,000 loads of English oak, are things of the past, and our ships of war are almost entirely built with iron. Still, oak is again in great and increasing demand, as the railway companies consume very large quantities for railway keys and trenails, and the framework of waggons, trucks, and carriages,

&c., as well as for posts for fencing; one company alone taking about 7,000 loads annually. There are several species of oak grown in England in addition to the common oak; but the principal are the *Turkey oak* and the *evergreen oak*: the latter is a valuable wood for cogs of wheels working in or through water, and is largely used in paper mills, &c.

There is a saying, that the life of an oak is 300 years—100 years to attain its growth, 100 years to remain in perfection, and 100 years to decay; but DRYDEN says—

“The monarch oak, the patriarch of the trees,
Shoots, rising up, and spreads by slow degrees.
Three centuries he grows, and three he stays
Supreme in state, and in three more decays.”

and in corroboration of this it may be mentioned that the well-known “Fairlop Oak,” in Hainault Forest, was, by the tradition of the county, as stated by Mr. GILPIN, in his *Remarks on Forest Scenery and other Woodland Views*, to be upwards of 900 years old. Much, however, depends on the quality of the soil and the situation of the tree; for the age of the reputed largest and most venerable oak in England (“The Cowthorpe Oak,” in Yorkshire, which still throws out leaves, and has a circumference close to the ground of 60 feet, and at 5 feet from the ground 36 feet 3 inches,) is estimated by Professor BURNETT at 1,600 years. I may also mention the extraordinary “Panshanger Oak,” which (on the authority of Mr. WALTER LANGTON, the well known timber merchant) contained, a few years since, 27 loads of timber, measuring everything down to 6 inches quarter girth.

Elm is the best when felled between November and February, and is chiefly used in situations where it is always wet or always dry. It is in great demand for keels of ships and planking, also for weather-boarding, coffin boards, seats of chairs, footboards for carriages, &c., and

is extensively used by wheelwrights, millwrights, and barge builders.

Ash is used almost universally. It is good for building or any other purpose where it is kept dry. It is used by the coach and carriage builder, the carpenter, cooper, turner, wheelwright, boat builder, and for the handles of axes and other tools.

Beech is much used in turnery, chairmaking, upholstery, &c., as being of a white fine grain. In building, it is asserted that, if constantly wet, it will outlast oak, and many thousand loads are now being used at the Government works at Portsmouth for piles, &c., while, on the other hand, it can be split so thin that it is used for band-boxes, hat-cases, book-covers and scabbards of swords.

Larch is perhaps the quickest in growth, and, in consequence, one of our most valuable trees, as it will grow in situations where other trees will not thrive, and is very easy of conversion and carriage. It is used extensively for railway and inland telegraph poles, for sleepers on railways, and for fencing, &c. It is of a tough nature, and it is asserted that a piece 11 inches square and $6\frac{1}{2}$ feet long can bear, if placed horizontally on its two extremities, a weight of 200,000 lbs. suspended from the middle of it.

Spruce and Scotch fir are now of little value, as "deals" are procured from Norway, Sweden, and Russia at such low rates, that it is cheaper to buy them than to convert English fir; the foreign deal, too, is of better quality.

It is worthy of note that, in Sweden, one stick of "fir" (*i.e.* Scotch) is equal in value to three of "white wood" (*i.e.* spruce) of the same size. "*Weymouth fir*" is much planted on account of its ornamental appearance; but, as timber in this country, it is not much esteemed, although our men-of-war are said to be generally furnished with masts of this tree from the timber yards of Nova Scotia.

Lime, *sycamore*, and *horse-chestnut* are extremely ornamental, from their growth and foliage, and valuable on account of the whiteness and softness of their wood. *Lime* is used by pianoforte makers, and by architects for the models of buildings. *Sycamore* is much used for churns, for printing blocks, &c., and *horse-chestnut* for rollers, &c., in the Manchester cotton mills; but it must, for this purpose, be perfectly white and free from stain.

The wood of the above three trees is in great demand for light bowls, dishes, cups, trenchers, and cabinet work.

Spanish chestnut is much used by furniture manufacturers. It makes heart faster than any other tree, and in consequence, is largely planted as underwood for the growth of hop poles; but the tree is also peculiar for decaying very quickly when once decay has commenced. It is very often shaky in the centre, and is particularly liable to be what is technically termed "ring" or "cup shaky." The wood will, however, last for centuries in the dry, the rafters and beams of some of our oldest manor houses and mansions testifying to this fact.

Poplar (including *abele* or *aspen*) is of very quick growth, and is, consequently, largely planted. The wood is much used for brake blocks on railway engines and carriages, and for packing-boxes, and is good for floors, and any other purpose in building where there is plenty of air; but, if laid on the ground, it rots directly.

I cannot do better than quote an extract from a letter in the *Times* on 26th ult., *à propos* of the late disastrous fire at the Pantechnicon, and in favour of massive timber for the internal support of heavily-loaded buildings:—

"Your correspondent 'A. Dawson,' in the *Times* of June 13th, 1873, told of a Nottingham manufactory, which burnt out to the top from a fire originating on the second story; but 'although the floor lay a yard thick

in hot clinkers and melted machinery, the fire did not get downwards, because the floors were of poplar.' For 200 years writers on arboriculture have reminded us that the abele, or white poplar, is light, unflammable, and well adapted for flooring rooms. Mr. JAMES BROWN, in his standard modern book, *The Forester*, relates that he sold a poplar tree only 35 years old, but containing 66 cubic feet of timber at 2s. per foot, or £6 12s. Old JOHN EVELYN himself, in 1675, says that 'the Dutch look on a plantation of these trees as an ample portion for a daughter,' which may truly be allowed, if, according to the calculation of Sir RICHARD WESTON, £30 laid out in these plants would render at least £10,000 in 18 years."

Plane is used for the same purposes as beech, which its wood much resembles.

Birch and maple are chiefly used for furniture; but many trees may be cut before one of suitable grain is found.

Walnut is the favourite wood for gun stocks, and it is asserted that in the last century the price of this wood was doubled in time of war. Now, however, so much is imported from Italy, that the English walnutwood is not so much sought after for that purpose, although it is in good demand for furniture; and "walnut vincer," of the wood known as "curly," or with good figure in the grain, commands high prices.

Yew furnished, in olden times, the long bows with which our English archers won so many battles, and of it bows are now made; but it is chiefly in demand for rustic work, turnery, and fancy articles, and is much valued by cabinet-makers and inlayers, on account of its beautiful red veins, while it is also used for flood-gates, axles, cogs for mill-wheels, and other works where strength and durability are required,

Alder is in demand for making gunpowder, as it is said to produce the best charcoal for that purpose, and in water, it will remain a long time sound; indeed VIRGIL, in his *Georgics*, makes record that in his time the trunks of this tree were hollowed out and made into canoes.

Cherry (wild) is largely used for chairmaking, and is about as valuable as beech. It is very ornamental in the spring when in blossom.

Acacia is not in great demand, and but little is grown; but it makes almost everlasting posts, and the wood is so hard that it turns the edge of the axe.

Cedar is used chiefly by cabinet and pencil makers.

Hornbeam is becoming very scarce, and the price has of late years risen rapidly. It is chiefly used for the cogs of mill-wheels on account of its hardness and elasticity.

Willow is converted into cricket bats, and sound trees command a good price, although it takes several years to season them for this special purpose.

Box is commonly sold by weight. It is hard, smooth and solid, and is chiefly used for musical and mathematical instruments, surveyor's scales, &c., and it is the only British tree whose wood is serviceable to the engraver.

Holly is very valuable when it is full grown. It is the whitest of all our hard woods, and is therefore much prized by inlayers, as well as the turner and carver.

NON-LIABILITY OF TIMBER TO LOCAL AND OTHER TAXATION.

Timber is not rateable, nor does it contribute in any way to local or other taxation; for, by the statute of 43 Elizabeth, c. 2 (the first of the present series of Poor Law Acts), only "saleable underwoods" are liable to be rated. The precise meaning of the words "saleable under-

woods" has occasioned much litigation; but it is only necessary here to refer to the case of *Rex v. Ferrybridge*, in 1823, when the court held that firs and larches, although cut for hop poles, were not saleable underwoods within the meaning of the statute, for the reason, amongst others, that upon being cut down they do not grow again, and that there is no regular course of cutting them for sale.

It is still a moot point whether timber ought to be rateable, and my opinion is, that it should not be rated *simpliciter*; but I think it is only reasonable that the land on which it grows should pay an equitable proportion to the poor and other rates. The question then arises, what is a fair proportion?—and I consider Mr. GOSCHEN's Bill on Local Taxation, in 1871, fairly provided for this in the 7th clause, which was, "where any land is occupied as a plantation or wood, or for growing timber, the gross value and rateable value of such land shall not be less than they would respectively be if such land were occupied for the ordinary purposes of agriculture, either as pasture or arable land."

Timber is, however, liable to succession duty, by the Act of 1853; but the successor may commute the duty upon delivering to the Commissioners a declaration by a competent valuer, with an estimate of the net amount which might be obtained by him from the average annual sale of such timber and other trees as might, in a prudent course of management of the property, be felled by such successor during his life. That is to say, a successor of the age of 35, being a son of the predecessor, and being left absolutely an estate of 500 acres, on which the timber and other trees are worth £2,000, the annual cuttings from which would, in a prudent course of management, average £70, would have to pay a succession duty of £10 10s., being at the rate of 1 per cent. on £1,050, which is the capitalized value of his life interest.

Timber trees were also always exempt from the payment

of tithes, although a notion formerly prevailed that no timber tree, under 20 years of age, was exempt from tithe when felled; but in 1840, Lord COTTENHAM, in his decision in the case of *Lozon v. Pryse*, clearly laid down that the clergy were never entitled to tithes from timber trees, of any age, growing from seed; but that they did claim tithe of timber from stools of whatever age it might be; and that the effect of the statute of Sylva Cœdua, passed in 1371 (45 Edward III., c. 3), was merely to declare that timber springing from stools, if of 20 years' growth, was as much exempt from tithes as timber growing from seed of any age was; it having then become "gros bois" (great wood) within the meaning of the statute. The cases of *Northleach v. Collard*, in 1694; of *Walton v. Tryon*, in 1751; and of *Morden v. Knight*, in 1752, all show that tithes were not payable in respect of loppings of pollard timber trees, provided such trees were above the age of 20 years before they were made pollards.

MANAGEMENT OF TIMBER.

I will conclude with a few remarks on the general management of timber, and I would say, most emphatically, that thinning is the most important part of the woodman's work. Mr. JOHN CLUTTON, in his remarks at our last Meeting, showed that of the seven different acre pieces that had been measured out in the Royal Forests, that acre having the minimum number of 40 trees, had matured more cubic feet than any one of the other acres. No rule can be laid down as to the number of trees which an acre will bring to full maturity—60 is, I believe, the number very generally acknowledged, and this would leave them 27 feet apart; but much depends on the nature of the soil and subsoil, and on the situation. With a substratum of rock or stone, the

leading shoot in oak, invariably dies when the tap root reaches the rock; but on such soils, as a rule, the timber grows kindly up to that point.

It should be the chief care of the woodman to leave the leading trees, and thin out the underlings, and to judge carefully from the nature of the soil how close the trees may be left for them to obtain a proper amount of nourishment. Open ditches should also be cut through woods which are at all wet.

On the question of pruning, I quite endorse Mr. JOHN CLUTTON's opinion, that if from too close contact with neighbouring trees or other causes, any boughs or limbs die, nature will relieve the tree of them in a far better manner than the woodman's axe. It is only in its earliest growth that the tellar may require pruning, and then only to take out a duplicate leading shoot. If a tree persistently throws out lateral branches, I would at once cut it down, unless required for ornament.

There is a great outcry at the present time, that the timber in England is being cut so hard, and that our stock will in a few years be so seriously impaired that we shall be entirely dependent on foreign timber for our annual supplies. I can only, on this point, speak with diffidence; but my opinion is that, although within a radius of 70 miles from the metropolis, timber otherwise than ornamental is being rapidly cleared, yet in other parts of the country the increased growth compensates for the annual felling. I do, however, state without any hesitation, that the saving of tellars, when underwoods are cut, is much neglected.

In the districts referred to in Mr. RALPH CLUTTON's Paper, oak is the natural growth of the soil, and comes up spontaneously with the underwood; but how often in woods in those districts does one look in vain for one tellar? and this only from neglect. Planting, again, is much neglected,

and no estate of any size should be without a *nursery*, which should contain not only plants for fencing, and evergreen shrubs, but also conifers, white woods, and forest timber.

I hope the subject of this Paper will induce other Members to give the Institution the benefit of their experience, and I have no doubt that the discussion which will now ensue, will elicit much valuable information.

Mr. W. BROWN (Member), after proposing a vote of thanks to Mr. WATNEY, said that he proposed to offer a few remarks with reference to Mr. R. W. CLUTTON's Paper; but before doing so he would notice one or two points in the interesting Paper just read by Mr. WATNEY, and which—more especially that part which related to the law of timber—would, he had no doubt, be of great value.

As regarded Mr. WATNEY's observations, with reference to timber on copyhold lands, he might observe, that at the present day, any rights of the lords of manors over timber were confined to a small portion of the country, —principally to parts of the home and midland districts; indeed, he knew many manors on which the lords had not the slightest interest of the kind. They chiefly arose upon arbitrary copyholds, which he was happy to say were not very numerous.

In the opening of his Paper, Mr. WATNEY had asked "What is timber?" Now if he (Mr. BROWN) were asked that question off-hand, he should say that any trees were timber which measured 6 inches quarter girth; and that all below that measurement should be classed as tellars. The allowance for bark was generally from one-eighth to one-twelfth; but in measuring beech, no allowance whatever was made for bark; and this was the case also with some other close-rinded trees.

Some surprise had been expressed by Mr. WATNEY, as to the price stated by him in his Paper, read last session,

to have been realized by beech, in Hertfordshire. As a fact, the price, as given by him, was rather under than overstated; and he believed that Mr. SEDGWICK would bear him out in saying that, in many instances, the price of that timber far exceeded the amount at which he put it.

As regarded Mr. R. W. CLUTTON's Paper, he might observe that when, in March last, he read a Paper before the Institute, he confined his observations to beech woods and larch plantations, knowing, as he then stated, that the more important question of oak woods and timber generally would be brought forward by others more competent to deal with the subject than himself, and in this he had not been disappointed. An additional year's experience told him that timber had increased in value, and seems likely to continue to do so, as the acreage decreases.

Mr. RALPH CLUTTON, at page 141, referred to the part of his (Mr. BROWN's) Paper on pruning; but it must be borne in mind that although the discussion diverged into questions relating to other kinds of timber, his remarks applied to larch plantations only, and he had seen no reason to alter the opinion he then expressed, that moderate pruning was beneficial. It must be borne in mind, that it was usual to plant larch at distances of 4 feet apart, which gave 2,752 per acre; and that when they arrived at maturity (80 years) not many beyond the odd 52 remained upon an acre. If pruning did not take place in their early stage the branches would soon interlace with each other and prevent a free circulation of air and retard their growth. No one had a greater objection to lopping trees than he had, causing, as it did, great disfigurement as well as injury to the timber, as shown by Mr. JOHN CLUTTON; but there was a wide distinction to be made between pruning and lopping.

Nothing was said in the Paper or in the supple-

mentary discussion, about bark, which makes a considerable difference in estimating prices. In valuing oak timber standing, the girth is taken over the bark, but when it is stated that a certain price is realized when sold, it must be without the bark. In Mr. CLUTTON's Paper, the timber was put at one uniform price; but it was well known that under 8 or 9 inches quarter girth it did not realize, per foot, much more than half of that double the size, and until this was explained it might mislead many proprietors. He had noted down two or three cases which had passed through his hands during the past season, and which did not happen to be mixed up with other matters. He assumed that it was the object of the Society to not only express but to give a record of actual transactions. With that view he would bring a few cases briefly under the notice of Members.

Case 1. Upon the Hartwell Estate, near Aylesbury, for which Mr. CHAPMAN (a Member of the Institution) is Agent. Season 1873.

128 Trees cut in thinning an Oak Plantation:—

	£	s.	d.
Contents, 883 ft., sold at 1s. 3d.	55	3	9
Less discount for cash	2	15	0
	52	8	9
6 tons 8 cwt. of bark, at			
90s.	28	11	6
Deduct peeling, at 25s.	8	0	0
	20	11	6
Fagots and hardwood tops	5	2	6
Deduct felling and making	3	0	8
	2	1	10
Net proceeds (minus commission)	£75	2	1

Average of timber alone per ft. . . .	1s. 2 $\frac{1}{4}$ d.
„ including bark and tops, and deducting expenses	1s. 8 $\frac{1}{2}$ d.

Case 2. Drayton Wood, near Tring. Season 1873.

	£	s.	d.
5 oaks, 141 ft., sold for about 1s. 10d., or	13	0	0
19 „ 219 ft., sold for 1s. 5d.	15	10	0
	28	10	0
Add bark, 2 $\frac{1}{4}$ tons	10	2	6
Peeling and carting off	3	18	9
	6	3	9
Fagots and tops sold	2	10	0
Deduct felling and making	1	6	6
	1	3	6
	£35	17	3

Average timber alone per ft. . . .	1s. 7d.
„ timber, bark, and tops	2s. nearly.

The beech thinned in this wood in the past season averaged 1s. 8d. per ft., and the tops half-price.

*Case 3. On the Haresfoot Estate, near Berkhamstead, Herts.
Season 1873.*

36 Oaks grown between Beech. Cleared entirely :—

	£	s.	d.
Contents, 880 ft., sold at 2s. 3d. .	99	0	0
4½ tons bark, at 90s. . 20 5 0			
Deduct peeling and carting 6 15 0			
	13	10	0
Fagots and tops . . 4 0 0			
Deduct felling and making 2 13 6			
	1	6	6
	£113	16	6

Average timber only per foot . .	2s. 3d.
„ „ bark and tops . .	2s. 7d.

He considered that underwood cut every 10 or 12 years, and sold at not less than £10 per acre, with a fair crop of oak (say 40 to the acre of all ages), was the most profitable growth for such lands. This extent of oak would not materially injure the underwood, particularly if large-headed trees were removed in time. Beech and ash were very injurious to underwood, and certain four-footed animals still more so.

His experience, as also that of his woodmen, was opposed to the statement that oaks grew fastest from stools.

COBBETT's rule was to cut off all young shoots to make them grow stronger; but, for timber purposes, he could not subscribe to that doctrine. As regarded self-sowing oak and beech, his woodmen were unanimous in their opinion that pigs did more good than harm by routing about for seeds, as by so doing they planted great numbers.

Mr. W. MENZIES (Member), after seconding the vote of thanks, moved the adjournment of the discussion till that day fortnight, when he hoped to make a few observations on both Papers.

Mr. J. H. LLOYD (Associate of Council) said that the statements of Mr. WATNEY with regard to the law of the question, were, no doubt, for the most part correct, and he thought them very interesting and important. He did not, however, if he rightly understood them, quite agree with one or two things stated in the Paper, and on the next occasion he would endeavour, as a lawyer, to state wherein he thought Mr. WATNEY in error.

The vote of thanks to Mr. WATNEY, for his Paper, having been carried unanimously, the further discussion was adjourned to the next Meeting.

AT
THE ORDINARY GENERAL MEETING,

Held on Monday, March 16th, 1874,

THE PRESIDENT IN THE CHAIR,

The discussion on the Papers by Mr. R. W. CLUTTON and Mr. D. WATNEY was resumed by

Mr. W. MENZIES (Member), who said that he was happy to have the opportunity of bearing his testimony to the great value of the two Papers under discussion. The particulars given by Mr. R. W. CLUTTON, relative to the system of oak growing, in Sussex, afforded, in many respects, very useful information for those who had the management of woods in parts of the country where the Sussex system, as a whole, could not be adopted. One of the most frequent questions put to him by the owners of old woods was how to renovate them without denuding the estates or altering their appearance (there was nothing so much objected to in these cases as anything like clearance), and to such inquiries he had always replied that they must adopt something like the self-sowing system of Sussex, taking a space where the trees were as nearly as possible of one age, and clearing it, and then if Nature showed no disposition to produce the trees where wanted, to plant in the cleared space the kind which grew best in the locality.

The author had omitted to give one fact of some importance, namely, the best area for each clearing. If he

recollected aright, Mr. ROBERT CLUTTON, in the course of conversation with him some years ago, gave it as about 100 yards each way. One of the woodmen present on the same occasion remarked that he always made a point of leaving trees with a good many branches round the edges of the parts cleared, in order that the temperature of the wood should be preserved unaltered, and the trees saved from the check which always followed any sudden change of the kind. This was exactly borne out by his own experience. He had always found that the more uniform the temperature of the wood, from the time of planting up to the age of 50 or 100 years, the better the trees grew. His practice, hitherto, had been to thin every 3 years till the trees were about 40 years of age. Acting on the advice of Mr. JOHN CLUTTON, he had changed the periodical thinnings after the trees had attained 40 years of age, to intervals of 6 years, and subsequent experience had convinced him that the change was judicious. Mr. RALPH CLUTTON's Paper contained some information as to the value of underwood; but its value varied so much with the locality, and depended so largely upon markets and other considerations, that he should be glad if some gentleman, practically acquainted with the subject, would, on some future occasion, read a Paper on coppices, and the multitudinous uses to which their products were applied.

Something had been said about foreign forests. He had, last year, an opportunity of observing a good many of the forests on the Continent, and found (especially in Germany) that they were left very much thicker than was usual in this country. In place of the 60 or 70 trees of 50 years of age, which would be found upon an acre in England, between three and four times that number would be found in Germany. There was great difficulty, as Mr. WATNEY said, in obtaining statistics on which a sound

judgment in these matters could be based. The conditions under which timber was grown were so variable, as to render anything like uniformity of rule very difficult of attainment. There was the greatest possible difference in the number of trees to the acre, and in their size, even upon the same description of soil, and over the same geological formation, according as they grew on a hill-side or in a valley, in an exposed situation, in a large plantation or in a small one; and these differences rendered the adoption of any inflexible system impossible. A few years ago he prepared a long list of over a hundred plantations growing in Windsor Park and Forest, varying in age from 1 to 282 years, and the differences they presented were something astonishing. One plantation, 280 years of age,—and there could be no doubt about the age, because the letter was found authorizing the plantation, —contained 21 trees to the acre, and the average cubical contents were 88 feet for each tree. Another plantation, 150 years of age, had 57 trees to the acre, the cubical contents of which averaged 85 feet. A third plantation, immediately adjoining, contained only 35 trees to the acre, the cubical contents averaging 70 feet. Yet, so far as he could judge, all these oak plantations had equal care and attention bestowed upon them. He would instance another case, still more remarkable, of oak growing in the true London clay—the case of a plantation 42 years of age, with 50 trees per acre, averaging 9 feet each, growing almost alongside 100 trees containing an average quantity of 11 feet each; yet all the trees appeared to be perfectly healthy and vigorous, and any one going through the plantation would be struck with their fine and flourishing appearance. It was impossible to account for these variations, unless by supposing them to be due to slight and casual differences in the depth and quality of soil,

and in the conditions of climate and exposure. Certainly it was not due to irregularity of management.

Allusion had been made to stub-grown oaks. The result of his own observation was that trees grown from stools did better up to 60 or 70 years than trees grown from seed; but that after that age they curled their heads over, were apt to become rotten at the root and hidebound, and ceased to thrive. He was not able to follow Mr. WATNEY in his exposition of the law of timber, but he would add a word or two with reference to his remarks upon its practical management. The importance of nurseries in connection with wood lands were not by any means over-rated by Mr. WATNEY. It was essential to the growth of good timber that the trees planted should be well rooted, and taken as soon as possible to the place where they were to grow. He had never known any good done by moving large trees. They were almost invariably injured by being transplanted. A few days since he examined some trees which he planted 15 years ago. Very much against his inclination he put in a few large ones, 15 or 20 feet high, and planted round them others, 18 inches or 2 feet high, and within 10 years the smaller trees were ahead of the larger ones. Nothing was more important than that the trees, when planted, should be small, well rooted, and kept clean. A great deal was said some seven or eight years ago about the cleverness of the French in planting the streets of Paris with large trees, whether in leaf or not, and it was thought at the time to be a feat beyond the capabilities of English foresters. He made it his business to see how it was done, and paid a special visit to the nurseries, when he found that the trees were grown in crates, and it was no more transplanting than the bedding of geraniums, or putting in orange trees taken from the conservatory. He had no doubt that each tree must

have cost £10 to grow and to move. There was some conflict of opinion as to when trees ceased to be thinnings and became timber. He was in the habit of considering a tree as timber when it attained 20 feet.

In conclusion, he hoped that the discussion would be the means of laying the foundation of what was so much needed, viz., a good practical work upon timber cultivation.

Mr. A. O. SEDGWICK (Member) said that 12 months ago he would have ventured to disagree with the opinion which had been expressed, that trees grown from stools did better than maiden trees. Last year he selected, for sale, 4,000 trees, from a wood of 600 acres, and he thought he was correct in saying that, of the 4,000, 3,000 were stem-sticks; and of those 3,000 stem-sticks, when cut down at the age of 60 or 70 years, 5 or 6 out of every 10 were decayed at the roots, so far bearing out what Mr. MENZIES said. Further experience, however, had convinced him that he might be wrong. In the same wood, not long since, he selected, for sale, 3,000 trees growing upon land of better quality. The stem-sticks of 20 years' growth, on that land, were straight and healthy, and four times the size of the maiden trees, of far greater age, close by. No doubt Mr. MENZIES was right in saying that a great deal depended on the soil. He had under his care a wood which had been managed successively by his grandfather, his father, and himself, for the long period of 54 years. It was something like 250 acres in extent, and about 25 acres of underwood were sold every year. After the woodman had marked the trees, and the underwood was cut, he (Mr. SEDGWICK) went round and selected the worst trees for felling. There was a capital nursery upon the estate; and after every fall of underwood, the vacant spaces were filled up with young trees. A mistake was

made in the instance he had been speaking of, in having too large a nursery, and the expense of maintaining it was much in excess of the requirements of the estate.

Referring to the value of underwood, he mentioned that this year 7 acres of it had realized an average price of £14 per acre. Ten years ago the same underwood averaged £13 5s. per acre, and the thinnings £3 per acre. On 18 acres, in the same wood, the underwood only averaged £5 per acre, and the thinnings about £5. On the 18 acres he found that the trees had been too thick and overshadowed the ground to such an extent that a large proportion of the shoots decayed, and a considerable annual produce was thus lost. It was only after the estate changed hands that the trees had been thinned; the previous owner not liking to cut down many trees.

Another question raised was, whether timber or underwood paid best. The following figures would, perhaps, throw some light on the point. They referred to the same wood of which he had been speaking:—

1863. 7 acres realized . £13 5 0 per acre.

1873. 7 „ „ „ 14 7 6 „

Thinnings this year averaged £3 per acre.

1873. 18 acres of underwood averaged £5 per acre.

Thinnings this year averaged £5 per acre.

Did it pay to grow timber and underwood? He could mention one wood and the results for 12 years.

Land . . £7,500

Timber . . 4,300

£11,800

For 12 years, timber averaged . . £189 per annum.

„ „ underwood „ . . 171 „

Total . . £360 „

thus showing a profit of £3 per cent.

These figures might assist Members in arriving at a conclusion as to whether it was better to grow timber only, underwood only, or timber and underwood together. In another wood the thinnings last year averaged £10 per acre, and the trees were very thick, but small. They were probably 70 or 80 years old, and very few had more than 2 or 3 feet of timber in them. On another 6 acres, the underwood averaged £3 per acre; and he had marked 300 trees to thin out; and, at the next cutting of underwood, it might make £7 or £8 per acre. It had been asked, when does underwood arrive at maturity? In the wood which he first mentioned, in which there had been sales of underwood, annually, for 54 years, it had realized on a portion, last year, £14 per acre, and it would make as much, probably, 10 years hence. The woodman, who had had great experience, stated that he believed underwood did not arrive at full maturity till nearly 100 years. He (Mr. SEDGWICK) thought 50 or 60 years was nearer the mark. He would venture to ask whether, in the case of timber grown with underwood, it would not pay better, after 60 years, to permit the growth of underwood, rather than let it perish, and sell the trees at the end of 100 years? On one occasion he valued 3 acres of wood, and it averaged £300 per acre. He wrote to the owner of the estate, and it was found from the deeds that the wood was about 200 years old. His client realized £900 from 3 acres of timber; but would it not have been better, if his father—who lived to between 80 and 90 years of age, and would never cut a tree—had thinned out judiciously, and planted underwood? The son would then have had a fair quantity of timber, and would also have been in receipt of an annual income from his underwood. This £300 per acre was a large amount of capital to be locked up for so many years. If, during the whole of that long period, the underwood had been cut every 10 years,

and the money invested, the son would have received, at the end of the time, much more than the £300 per acre.

There was no better way, he thought, of disposing of underwood than by auction. He had had the management of a large wood where for 20 years a steward had been kept at a salary of £100 a year, as well as several woodmen, the expense of management amounting to between £300 and £400 a year. He reduced the staff to one woodman, with occasional help, and sold the underwood every year by auction,—the purchasers cutting it,—and he realized more by the sale than was previously obtained when the owner cut it at his own expense. He did not agree with Mr. BROWN that it was necessary to prune larch. Nature herself would do whatever was required in that way. About 15 years ago he went into a plantation of larch some 60 or 70 acres in extent, and in 5 or 6 years he cut down 35,000 larch trees. When he first commenced cutting, the trees were 18 years old, and they averaged 1s. 4½d. per stick, and, supposing 2,500 sticks per acre, the total amount realized was £165. He would be glad to hear whether, in the opinion of Members, it would not have paid better to have cut down the whole of the larch at that period, as between every row of larch there was a row of timber trees and underwood. Another larch plantation which he remembered, was never pruned, and was thinned to about half, after 10 years' growth, and made at the rate of £40 per acre.

His name was mentioned by Mr. WATNEY in connection with the price of beech wood as given by him on a previous occasion. In the instance which he mentioned last year, and to which Mr. WATNEY referred, the faggots and top wood more than paid the expense of felling; and the purchasers had to take the timber out of the woods themselves. He had sold beech, on Lord CHESHAM's estate.

In 1863 he sold 415 trees, containing 7,984 feet, or an average of 19 feet per tree, and the price they realized was 1s. 1d. per foot. Last year he sold 661 trees, containing 17,000 feet, or an average of 25 feet each, at the price of 1s. 11½d. per foot. The price which ash realized was striking. Trees, averaging 34 feet each, instead of making 2s. 3d. per foot make 3s. 4d. in one case and 4s. in another. It was fair to say that though these prices might be realized by auction, the great expense of selling by auction, as well as the risk, must be taken into account. He hoped that before the discussion closed some further information would be elicited with regard to pruning, more especially what was called close pruning. There were four kinds of pruning, viz.:—close pruning, Nature's pruning, sack pruning, and foreshortening. The first might sometimes be done, but with great care and judgment; but the pruning that answered best next to natural pruning—or the casting off by Nature herself of superfluous boughs—was foreshortening, or cutting off the ends of boughs. He remembered a sale some years ago at which it was said that the timber would not fetch good prices, because it had been close pruned; but the fact was that the sale of two-thirds of the wood realized as much money as was paid for the whole of it. Perhaps some kinds of timber might be close pruned and others not. He would conclude his remarks by quoting an extract from a book, printed in 1738, which would be found in the Library, and was entitled "The Surueyor's Dialogue." It contained some good advice:—

"Therefore must the Surueyor be heedefull, I say, to note what trees are among the vnderwoods, and must also haue skil to iudge of the values of the trees: namely to iudge what a tun of timber, or a load is worth, and how many loades a tree will make. And because this is not

alike in all places, he must be carefull to obserue the plenty or scarsitie, the vse and little vse of timber or fire-wood in the place where he is to deale, and accordingly in discretion to iudge of the values of that he hath in hand, else may he deceiue himself and his Lord much, if he prize wood in the wield of Sussex, as it is worth about Salisburie plaine."

Mr. G. CHAPMAN (Member); said that he would not have risen had not Mr. BROWN mentioned his name in connection with the prices of timber. With regard to the prices obtained on the Hartwell estate, he might mention that the ash and chestnut realized 2s. 9d. per foot, and the lime and sycamore 2s. 6d. per foot. One fine lime was sold for 4s. per foot. This latter was in much request for the lining of railway carriages, being used in large slabs for decoration, instead of paper. Four larch trees were sold at 2s. 3½d. per foot; the elm at 2s. 8d., and other timber at 2s. 9d. per foot; showing that white wood was coming very much into general favour. In Berkshire, he had sold timber this year—oak, ash, and elm together, —to a timber merchant for £5 per load. Abele, though not a very quick growing wood, was very useful for indoor work, and he thought he was right in saying that it was used largely for beams in Belgium, and as it grew to perfection in 21 years, it formed a valuable and profitable crop. He had lately planted a great deal of alder, solely for the purpose of underwood, and at 7 years old it would sell as underwood for about £10 per acre. It was used chiefly for rake and mop handles; the remainder being made into faggots. The mop handles sold for 3s. 6d. per 100; the rake handles for 7s. per 100; and the faggots for 3s. per score; realizing altogether about £10 per acre.

He strongly disapproved of the practice of pruning, although it was occasionally necessary when a tree threw

out one branch very awkwardly, to stop it back by taking off the end ; and he did not find that pruning to that limited extent caused any injury to the tree, while at the same time it gave more space for the underwood to grow. The oak plantation on the Hartwell estate, referred to by Mr. BROWN, was a small wood of $1\frac{1}{2}$ acres, about 40 or 50 years old, and the timber sold for £75. Sufficient trees were left in it to make a good wood, as well as a good growth of underwood.

He had a prejudice against the practice of growing trees from stools, and believed that, in nineteen cases out of twenty, trees so grown were rotten at the bottom, and never produced timber of so good a quality as maiden trees. He could corroborate what Mr. BROWN had said as to the advisability of growing the white woods, which were coming more and more into use ; elm, also, was worth growing, being used in the chairmaking districts much more than formerly. The poplars of Buckinghamshire were also held in great favour. They were well known in the London market, and always met with a ready sale, at good prices.

Mr. ANDREW MURRAY, F.L.S. (Visitor), desired, with the permission of the Meeting, to offer a few observations on Mr. WATNEY's Paper. It was a Paper of a very instructive kind, and one particularly valuable for purposes of reference.

The author, though noticing to some extent the effects of climate and locality upon the value of timber, scarcely gave to those conditions the prominence which was their due. Timber could not, like corn, be grown under conditions of nearly equal advantage in any part of the country, its profitable production being dependent upon roads and distances, as well as upon the local demand, the actual value of the timber, in some cases, being secondary to these

considerations. Attention was drawn by Mr. MENZIES to the difference in the mode of growing timber in Germany and in this country, and it was suggested by him that a comparison of the two systems would be interesting. Whoever undertook the task, however, should remember this—that the growth of timber in Germany and in England was promoted for totally different purposes. In Germany the object aimed at was the production of the greatest possible amount of woody fibre which could be grown upon an acre of land, in a certain time, for purposes of fuel; every additional ounce of such fibre being so much gained; while in this country timber was grown mainly for constructional purposes, quality being a principal object; and until the coal fields were exhausted, there was no necessity for following the example set by Germany.

Nearly all the trees brought under review in Mr. WATNEY'S Paper were British trees. He (Mr. MURRAY) had lately returned from a visit to North America and California, where he had enjoyed an opportunity of examining many trees, indigenous to those countries, which were familiar to many in England as specimen trees. Some of them seemed to be so valuable that they were deserving of special attention as forest trees. Of all the trees which he saw (putting aside the *Wellingtonia gigantea* and the *Libocedrus decurrens*, which was very similar in appearance to the *Wellingtonia*, though of a different genus, but having the same red bark and columnar stem, the same buttresses springing from it, and, in fact, corresponding with it in many other respects), nothing struck him more than the *Pinus ponderosa*, or Yellow Pine, which was most generally used for timber in California. It is cultivated in this country; but what is as yet here seen of it gives no idea of what it grows to in its native country. There it is truly a magnificent tree, presenting a branchless stem like

an Ionic column 150 or 160 feet high, almost as thick at the top as at the bottom, as the foliage above is comparatively trifling; and one was apt to wonder how so small an amount of leaves ever produced such an enormous bulk of stem. It was marvellous to look at. A good illustration of the size of these trees was to be seen in the use they were put to for dividing land. When a settler fenced off his ground, he cut down these trees, causing them to fall in the line which he wished to fence. Three or four of them were almost sufficient to fence the side of a field, and being 8 or 9 feet in diameter, the fence, as might be imagined, was one of a very substantial character.

In no respect behind the Yellow Pine was the Douglas Fir. These Californian Conifers were all distinguishable by the differences of their bark, which was convenient, as the foliage was generally out of sight. The bark of the *Pinus ponderosa* consisted of great lozenge-shaped scales, 3 or 4 feet in length, and about a foot in breadth, whilst the bark of the Douglas Fir very much resembled cocoa fibre. The *Picea, grandis* was remarkable from its bark being almost white, and the *Pinus contorta* was a tree with smooth bark, very much like that of the English beech. He was convinced that if some of these trees were grown, in greater quantities, in this country, they would be found remunerative for many purposes.

The only tree of foreign origin mentioned by Mr. WATNEY was the Weymouth Pine; but it was not to be compared with the Sugar Pine of California in quality of timber or in magnitude. He had seen those trees 200 feet in height. One singular feature of the country of which he was speaking was the entire absence of sward during at least three-fourths of the year. During summer no grass was to be seen between the Rocky Mountains and the Pacific coast, except on the lawns of the villas in San

Francisco ; affording an indication of the dryness of the soil, and the want of moisture during the summer season.

Mr. P. D. TUCKETT (Member) said that he had been struck with the great practical utility of the two Papers under discussion. As Mr. WATNEY's Paper would be especially valuable, if his law was correct, for purposes of reference, he trusted that Mr. LLOYD would kindly give the opinion he promised at the last Meeting, as to whether it was substantially accurate. Mr. RALPH CLUTTON's description of the proper way of managing oak woods was very instructive; but the miserable part of it was, that in practical life one was seldom called upon to deal with a wood which had been properly managed previously. The question of pruning, therefore, did not generally present itself as the simple question of what ought to be done, all that was right having been done previously, but what ought to be done under the actual circumstances; in such a case, for instance, as where a wood could not be cleared, and had been more or less mismanaged. He was of opinion that a wood, if properly cut out from the beginning, would not want much pruning; but if allowed to get too thick in some places and too thin in others, it might be necessary, not indeed to lop close to the stems, but to shorten some of the branches occasionally, otherwise trees must be sacrificed which it was desirable to preserve; or, in order to preserve them, an undue amount of underwood and other trees must be spoiled.

The methods of growing timber described in the Papers applied, principally, to oak woods, and very little had been said about the treatment of other kinds, such, for instance, as beech, which grew up in consecutive crops, the large trees being taken out, and the smaller ones allowed to take their places. He thought Mr. WATNEY's prices for the principal

kinds of timber substantially correct for average timber, but the range of prices was still larger than that given, and he had frequently sold both above and below the figures quoted.

Mr. J. H. LLOYD (Associate of Council) said the few remarks he had to make would tend to the comfort of the gentleman who had just spoken. He had considered the several points of law propounded by Mr. WATNEY, and though, at first sight, he had expressed some doubt whether that gentleman had not gone too far in one or two of his propositions, he had satisfied himself that, substantially, Mr. WATNEY had given a correct analysis of the law with regard to timber. The doubts which he (Mr. LLOYD) at first entertained, were with regard to the relations between the lessor and the lessee, and it was obvious that they very much depended upon the nature of the contract between them. If there were inconveniences in the law which pressed unfairly upon either party, in cases where no contract existed, it showed how important it was that these matters should be carefully looked to in the settling of leases.

Mr. G. WEBB (Member) said that he should like to add a few facts tending to confirm what Mr. JOHN CLUTTON had said as to the growth of timber. He could corroborate the statement that timber did not grow so fast in an exposed as in a sheltered situation. About 18 years ago, he was desirous of trying the difference in the growth of oak timber on clay soil in the weald of Kent, and on loam, near Sittingbourne, and accordingly he measured a large quantity of trees, taking them just as they came, when the underwood was felled. Unfortunately, he was prevented from carrying out his trial in the weald, owing to the sale of the estate, and the felling of the trees; but he was able to measure most of the trees in Oak Wood, Tunstall, and

would give a few of the results. He would first give the measurement of 11 oak trees in an exposed park, which were carefully measured in 1808, and also in 1814. The contents were as follows,—in 1808, 336 feet; in 1814, 386 feet; and in 1874, 1,245 feet. The latter contents, valued at 3s. 6d. per foot, amounted to £218. Deduct the 336 feet, which the trees measured in 1808 = £58, and the remainder, £160, would represent the increase made in 66 years, being about equal to 2 per cent. at compound interest. The measurements of 13 oak trees growing in Oak Wood, and taken in the years 1856, 1868, and 1874, were as follow:—In April 1856 the total contents were 67 feet; in 1868, 126 feet; and in February 1874, 183 feet. The valuation of these trees in 1856 was £9 10s.; in 1868, £18 14s.; and in 1874, £28 4s.—the increase in the total value for the 18 years being about 6 per cent. at compound interest. There was also a singularly fine growing oak in the same wood, which measured in 1854, 16 cubic feet; in 1868, 37 feet; and in 1874, 64 feet. The increase in 20 years, therefore, was 48 cubic feet,—valued in 1854, at £2 8s.; in 1868, at £6; and in 1874, at £8 16s., being at the rate of about $6\frac{1}{2}$ per cent. at compound interest for the first 14 years, and 8 per cent. for the last 6 years. The yield of bark from timber was referred to by Mr. WATNEY. His (Mr. WEBB's) experience had been that from trees growing in ordinary soil, the yield of bark was about 11 cwt. per load of timber. On the better soils of Kent, it was commonly from 13 to 14 cwt. per load; a little beyond the yield as given by Mr. WATNEY.

Mr. MENZIES begged permission to mention, as the result of his examination of the growth of oaks, that on average clay soil, a tree in 10 years' growth increased 1 inch in radius. That held good up to 120 or 130 years'

growth. After that period, the rings became much closer together, from which he deduced the fact that after 130 years the trees did not increase at the same rate, and did not lay on the same quantity of timber as at the first period of their growth.

Mr. J. CLUTTON (Past President) begged to add a few words in explanation of what he stated at the last Meeting, with reference to timber in Richmond Park. Those trees were measured in 1870, and again in 1874, with the following results. In Upper Pond Plantation, planted in 1824, 60 oak trees measured, in 1870, 672 feet, at £6 per load = £81; in 1874 the contents of the same trees were 966 feet, at £6 = £116. In Kingston Hill West Plantation, planted in 1826, 46 oak trees measured, in 1870, 628 feet, at £6 = £75; the same, in 1874, measured 820 feet, at £6 = £98. In Isabella Plantation (old portion), planted in 1831, 68 oak trees measured, in 1870, 460 feet, at £6 = £55; in 1874 the same trees measured 650 feet, at £6 = £78. In Isabella Plantation (young portion), planted in 1845, 110 oak trees measured, in 1870, 406 feet, at £6 £49; in 1874, 646 feet, at £6 = £77 10s.

He admitted the difficulty of obtaining accurate data for the comparison of the quantity of timber in different stages of its growth, as no two men measured with the same result; but, in the instances above given, the measurements were made, on both occasions, by the same gentleman, one whose accuracy could be perfectly relied on. He quite agreed with much that was said by his friend Mr. MENZIES and others with regard to the quantity of bark. In Sussex, both the quantity and quality of the yield of bark was found to depend upon a variety of circumstances—whether the tree grew alone or with a number of others; whether it had been boughed or had grown thickly to an extent which was

injurious, and whether it was overcrowded by other trees, as was the case in the forests abroad. It was a well-known fact that the bark on trees standing in the hedge-rows of Sussex was three times as thick as that on trees growing in the woods. He had known four loads of timber to yield as much as $2\frac{1}{4}$ tons of bark,—nearly double the quantity given in Mr. BROWN's return, and he had no doubt that the difference in yield was owing to the fact that in the one case the trees grew alone, and in the other were grown among a number of others, and had little or no top.

As regarded the price of timber, as given in his nephew's Paper, he might mention that it had been advisedly put at an uniform figure, the object being to show the average rate of timber growth, and the amount which trees, when fairly managed, would produce at maturity. It was done simply for purposes of comparison, and he contended that any other method for that end would be fallacious. It was true that a small tree of 10 feet, felled for the purpose of relieving the permanent crop, was only worth 2s. or 2s. 3d. per foot; still, a tree left for the ultimate crop, of 10 feet, was worth a proportion of the value of a larger tree when it arrived at maturity,—say 3s. or 3s. 6d. per foot.

He was anxious not to be misunderstood with regard to the question of timber grown from stools. His remarks did not refer to such old stools as Mr. SEDGWICK alluded to, but to comparatively young stools. In the selection of young trees to stand for a crop, if a tree from an acorn were found, of equal size and age, standing near to a tree growing from a stool, he would select the tree from the acorn; but, if he found the acorn tree of only half the size of the low stool tree, he would keep the latter and cut down the former. A shoot from a well-established low stool would be forced more rapidly than a tellar from an acorn. He had seen large timber cut down, and a fresh shoot grow from the stool,

take root, and, after a time, form an independent tree. Some 45 years ago, when a boy, he had seen, in his father's woods, some stools from which trees had sprung; but the stools themselves could not now be distinguished at all, and no one would know that the trees had been grown in that way. Of course he did not contend for a moment that the system could not be carried to an absurd extent; but he would assert his conviction that, in a general way, more timber could be grown, in a given time, from low stools than from acorns. Where timber and underwood were grown with the single object of the largest return for a long period of years, it was not expedient to allow oak timber to stand beyond 80 or 100 years,—that was when the trees attained a fair marketable value, say, of 25 or 30 feet,—as if they were then cut down the money product would, if invested, produce $3\frac{1}{2}$ or 4 per cent. interest, and the land would produce a crop of underwood and timber again, as before. If the timber were left to be very old, the underwood stools were many of them destroyed, and for underwood growth the land must be to a great extent replanted.

With regard to the question put by Mr. WATNEY, "What is timber?" he might mention that many years ago an estate was left under will to Exeter College. The timber was to be the property of the College, but the underwood was to go to a body of vicars. Litigation arose upon various questions, one being what was timber, and which underwood. The case was eventually left to his father, and it had since been a rule that trees of a quarter girth of 6 inches were timber, and all under that dimension which were not required for the ultimate crop went to improve the underwood produce. Reference had been made to the tap roots of oak trees. For his part, he did not believe in the existence of tap roots after a certain number of years growth. No doubt the oak, like other plants, in the first

instance sent a root into the soil to establish itself, and, that up to a certain period of its growth, that tap root remained; but he had cleared many hundreds of acres of wood, and he never saw an old oak tree which had a tap root. He proceeded to observe that he had brought with him to the Meeting some interesting documents with regard to the decrease in the quantity of timber, particularly in foreign countries. The first to which he would refer, was a communication from Stockholm, addressed by Mr. Erskine to the Secretary of State for Foreign Affairs, and dated 19th February, 1874, which stated—

“Among the various projects introduced this session in the Lower Chamber, is a motion by Mr. Backstrom, one of the Members for North Bothnia, in regard to forest preservation, which gives a lamentable account of the rapidity with which the forests are disappearing in the North of Sweden.

“His statements professed to be based upon the report of a Committee appointed by the Diet in 1868, and although some of the references he draws may be overstrained, the statements are, in the main, trustworthy.

“According to this gentleman the provinces in question, viz., North Bothnia, West Bothnia, West Northland, Jemtland and Gefle, are covered with forests owned by private persons, which could, without detriment, be made to yield about 1,759,828 trees annually, exclusive of the wood required for domestic purposes. On the other hand, the ascertained consumption in the year 1868 was not less than 3,000,000 trees, and so rapid has been the consumption since, that it is believed to have amounted, in 1873, to 6,000,000 or 7,000,000 trees. The Committee calculate that if the normal yield of 1,759,828 trees were multiplied by 124 years, which is the time allowed for the timber to attain its full growth, the result would be the total of

218,218,672 trees, which might, in that time, be cut down without injuring the forests. Now if this number be divided by the 7,000,000 or 8,000,000 trees, alleged to be annually cut down, it will be seen that at the end of 25 or 30 years not a tree fit for industrial purposes will be left standing in any of the private forests of these five provinces."

This gave substantial reasons for the passing of some law for preventing the reckless destruction of timber. He had in his possession a number of documents from France and Germany, all pointing to the same end, and showing the importance of that larger question of general timber cultivation to which the Papers were in some measure introductory. One of the speakers had asserted his belief that the quantity of English grown timber had not materially decreased. He must say that he was personally of an opposite opinion. He had himself destroyed many thousand acres of timber on land on which timber was formerly exclusively grown. It was impossible to traverse the counties with which he was best acquainted (the southern counties) without being struck by seeing fields of from 20 to 40 acres, where formerly the average was about 5 acres per field. In one case (in the district of Headcorn) the average was under 3 acres. He maintained, therefore, that it was contrary to fact to say that the quantity of timber-growing land in this country had not vastly decreased. He had brought with him a valuable Paper, which he had been desired by Mr. HOWARD to place at the service of the Society. It was a report, in French, of a commission appointed by the National Assembly, which Lady Louisa Howard had been good enough to translate, and place at the disposal of the Institution. Extracts from this report would, he thought, be well worthy of publication in connection with the proceedings.

The object of the report was to show the desirability of

transferring the management of the forests of France from the Revenue department, to the department of Agriculture. The document demonstrated, he thought, the folly of destroying the young timber in this country, growing on land well adapted for the purpose.

The present tendency in England was not only to check the growing of timber, but to sacrifice everything to the growth of corn,—a principle he by no means agreed with. No doubt land worth 40s. an acre should be appropriated to something better than the growth of timber; but there was plenty of land, such as the New Forest, which was not worth for cultivation more than 10s. or 12s. an acre, and which was better adapted for the growth of timber than for any other purpose.

The rating of timber, also, would tend to discourage its growth in any large quantity; for who would keep wood lands not worth more than 10s. an acre, if they were rated the same as arable land, which, by an outlay of £20 per acre, produced a very much larger income? No other result could ensue than the destruction of all the large woods in England. The system in Scotland was to rate plantations at 1s. 6d. or 2s. an acre, or at a merely nominal rate; but that was a very different thing from the proposal in Mr. GOSCHEN's Bill, to rate wood lands at the same value as the cultivated lands adjoining, a change which could not fail to have a most disastrous effect in checking the growth of timber in this country.

On the motion of Mr. E. RYDE, the discussion was then adjourned till the next Meeting.

AT

THE ORDINARY GENERAL MEETING,

Held on Monday, April 13th, 1874,

THE PRESIDENT IN THE CHAIR,

The discussion on the Paper, by Mr. R. W. CLUTTON, entitled, "The Self-Sown Oak Woods of Sussex," and that by Mr. D. WATNEY, entitled "Timber," was resumed by

Mr. E. RYDE (Member), who said that in the few remarks which he proposed to make, he should avoid, as far as possible, ground which had already been traversed by previous speakers, and confine his observations to a few points which had scarcely received as much consideration as their importance deserved.

Among the more prominent of these, and worthy to stand in the foreground, was what he might call the cumulative power of money—the very rapid rate at which it accumulated at compound interest, after the expiration of a certain number of years; and it seemed to him that Members who had taken part, heretofore, in the discussion had almost entirely overlooked that fact in estimating the profits to be derived from the cultivation of timber. To illustrate this point with reference to many of the instances given would occupy a very long space of time, and he would content himself with directing attention to one or two of them. To take an example from the remarks of

Mr. SEDGWICK, who had given the result of his experience (page 196), in dealing with a wood of 12 acres in extent. He put the question, "Does it pay to grow timber and underwood together?" and, by way of answer, gave the results of the sale of an estate (land and timber together) for £11,800, meaning, as he (Mr. RYDE) supposed, that the land was purchased with the timber on it for £11,800, the timber itself being valued at £4,300. The speaker referred to, then went on to state that the sums received from the sale of timber on that estate, during 12 years, averaged £189 per annum, and from underwood £171, making together £360, or 3 per cent. upon the purchase-money. He was at a loss to discover the way in which these figures were to assist Members in arriving at a conclusion as to whether it was better to grow underwood only, or timber and underwood together. No materials whatever were here furnished for the solution of the problem. To assume that £4,300 worth of timber was purchased, and that every year, for 12 years, £160 or £180 worth of timber was sold, would be to imply the destruction, gradually, of all the timber bought: where, then, would be the 3 per cent. interest? Mr. SEDGWICK had evidently overlooked the fact that he was consuming his property year by year. It was true, no doubt, that young wood might be planted to make good the consumption; but it was equally true that the new plants would take from 60 to 80 years to arrive at the value of the old; whilst, in 20 years, all the timber, in the purchase of which this capital had been sunk, would have vanished.

Passing to the Paper by Mr. RALPH WILLIAM CLUTTON, he might notice, in the first place, one very small point. The passage to which he alluded would be found on page 144. For the last 30 years he (Mr. RYDE) had been accustomed to take the price for which underwood might be

expected to sell, as representing the same number of shillings per acre as the rateable value of such land,—as close an approximation to the value as need be. What were the facts as deduced from the example given by Mr. CLUTTON? According to that gentleman, the underwood was to be cut at 10 years' growth, when it was worth £10 per acre. Assuming that all the wood made in that time were cut, the process must then commence *de novo*, and another 10 years must elapse before a fresh crop was obtained. The £10 then was equal to 16s. 8d. per acre. From that amount as much as 2s. 6d. per acre must be taken off for rates and taxes,—assuming a rateable value of 10s. per acre. From the balance left, a further sum must be allowed for fencing, and some little amount of looking after, which might be taken at 4s. 6d., thus leaving 10s. as the rental value of the land.

On page 446 of the Paper, Mr. CLUTTON dealt with a wood the timber in which was computed at 4,329 feet, and at the bottom of the page stated that its value was equal to £85 per acre. This was a good illustration of the speaker's argument, for it was stated on the next page that the same timber was valued 7 years afterwards at £110 per acre. The timber valued at £85 per acre was supposed to be 100 years old; and when valued at £110, it was supposed to be 107 years old.

[Mr. CLUTTON observed that the converse was intended.]

Mr. RYDE: If that were so, the statement, as it appeared in the Paper, was incorrect. If the timber, when 100 years old, were worth £85 per acre, and when 107 years old, only £110 per acre, the purchaser of that timber would receive no rent whatever for his land in the interval, the money which he had sunk, amounting, at 4 per cent., to £111 17s., while the timber was worth only £110. His object was to prove if that were so, that the timber ought to have been

cut when it was worth £85, and it was a loss to let it stand for a longer period. The proper period for cutting was one of the most important points to consider when timber on land was purchased. There could be no doubt that up to a certain period it paid to grow timber: but beyond that period the profits derived were very doubtful.

The method set forth by Mr. WATNEY for the measurement of timber was well known, and was no doubt the best available way of arriving at the customary measure of standing timber. But the accurate cubic contents of timber could only be ascertained by taking a greater number of dimensions.

The element of uncertainty in the method was the guessing the proper mean average quarter girth, which was not necessarily in the middle of the stick, as trees varied infinitely in shape from each other, and no fixed height from the ground could be taken for the application of the strap, with any great precision in the results. There was no contravening the fact that the measurement of timber was one of the roughest operations which surveyors performed. A competent surveyor would scout the notion of measuring an irregularly-shaped piece of land by getting the measurements approximating to its mean length and mean width, but the timber measurer was content to follow a mere rule of thumb in the practice of his art.

It was stated by Mr. WATNEY that 100 trees could be measured in one hour. Speaking from his own experience, he was inclined to pronounce it extremely good work in one sense, and extremely bad in another sense; for he was satisfied that no one could properly measure 100 distinct trees in the time stated, with any pretensions to accurate results. It would be interesting to hear from Mr. WATNEY how he dealt with the lop and top of the tree, because trees were not always great straight sticks, but often had large

ugly branches, which had to be considered in the cubical contents.

There was much variation of custom, in different parts of the country, with regard to the allowance for bark in taking the quarter girth.

With reference to the value of timber, he believed that the time was near at hand, if indeed it had not already arrived, when the value of timber on land would depend only in a very small degree upon its cubical contents. The period was rapidly approaching when all land would possess a dormant value beyond the merely agricultural, and whenever that happened, the timber participated in the increased value, not as a commercial product, but as contributing an ornamental feature to the land on which it stood. Hence it was possible to conceive the arrival of a time when it would have become unnecessary to measure timber in England, or concern oneself at all with its cubical contents. It would amount to this—the land without the timber would be worth so much, but with the timber upon it so much more.

Before leaving the subject of timber measurement, he might mention that he had brought with him some tables, published by him many years ago, which gave each foot in length up to 40 feet, at every quarter inch of quarter girth, from 1 inch to 40.

He was sorry to see that a measure had been proposed for the separate rating of timber. Timber upon land was rated, at the present time, to a much greater extent than was commonly supposed. To give an instance, viz., that of a large park with a house in the centre. The house with the park was rated at a certain sum, on the assumption that it might reasonably be expected to command the rent at which it was rated. Without the timber the property would not command the same rent, or anything like it; therefore in such cases the timber was indirectly rated. Again, two or

three large cedar trees in the grounds of a suburban villa added to the value of the property considerably, and it was rated to the full value, including the value which the cedar trees gave it. He believed that only a small breadth of land under timber cultivation without underwood, really escaped taxation on account of its technical exemption. The proposed rating of timber would not be an unmixed evil so far as the interests of surveyors were concerned, for it would inevitably give rise to a very large amount of litigation; but he was sorry to hear of the proposal to rate timber land the same as the arable land adjoining, for nothing could be more unfair. If the owner of a piece of land (ill-shaped or inferior in quality to the adjoining land) fenced it off and planted it with timber because it was fit for nothing else, to assess that land at the same rate as other land adjoining would be prohibitory with regard to the growing of timber, and the owner would prefer grubbing up the wood to paying the rates. If it were to be rated at all, it should be done on the assumption that 100 years hence the timber would be worth £80 or £100 per acre; and then the question would arise as to the amount which a succession of tenants should be expected to pay for that land, assuming that 100 years hence the survivor would be recouped by the sale of the timber.

MR. J. OAKLEY (Vice-President) said that he would not trouble the Meeting with many observations, but he had been much interested in the two Papers now under discussion,—the one dealing with the nature and management of timber, and the other with the timber when it had to be converted into money. He (Mr. OAKLEY) had enjoyed considerable experience both in the cultivation and sale of timber; but more especially in the latter. He found that a very large proportion of the woods* and timber which had

come under his notice for purposes of sale or purchase, had been, according to his judgment, mismanaged; and he thought that very insufficient attention had been paid to the woods in England. The same might be said of some parts of Scotland and many parts of Wales. Mr. CLUTTON had demonstrated that it was right to grow underwood with timber, and timber with underwood, up to a certain age; and he had no facts before him which would enable him to speak authoritatively on the point; but, as in some degree illustrating the advantages of judicious planting, he might mention that many years ago he advised a land-owner to plant some land with chestnuts, which, during 40 years, had been cut five times for hop poles, and had produced a price which was equal in rent to four times its value before it was planted. On the other hand, he had seen timber planted from which no return whatever was received,—chiefly owing to bad management. He thought, therefore, that Mr. RALPH W. CLUTTON had done good service in bringing a Paper before the Institution, which would, he hoped, induce those interested in such matters to cultivate timber, by showing them that there was a good account to be derived from it, as well as from turnips and wheat. He had been forcibly struck with the mode of managing underwood in Herefordshire. The underwood was not sold separately, but the underwood and timber were allowed to grow together, and at intervals of 12 or 16 years, both the timber and underwood were sold, a large number of thrifty plants being left for future growth: by that plan he believed that a larger net return was made than was the case with the best woods of Kent and Sussex. His decided opinion was that, under proper treatment, underwood and timber grown together would pay much better than either grown separately. He had had no personal experience of timber grown from stools, but he believed,

with Mr. JOHN CLUTTON and Mr. MENZIES, that the younger they cut it the better tree it would produce. He found, in the case of hop poles, that if the single plant were allowed to remain, but one pole would be obtained, whereas, if it were cut down the second year after planting, there would probably be half-a-dozen shoots in place of one.

His friend, Mr. WATNEY, had given surveyors the best text book upon timber that he knew of, and he was glad that Mr. LLOYD was able to assure them that the law, as laid down in the Paper, was sound.

In the early part of his Paper Mr. WATNEY mentioned, with reference to timber as distinguished from underwood, that an attempt had been made, in the neighbourhood of Guildford, to set up the practice of including as timber, trees measuring less than 6 inches in quarter girth. In the year 1857 or 1858, he (Mr. OAKLEY) was appointed umpire between the late Mr. CHINNOCK and Mr. JEREMIAH MATHEWS, to settle the value of some timber in Wales. The estate was put up to auction, with the usual covenant that all timber and timber-like trees should be paid for as well as plantations. The estate was not sold by auction; but Mr. MATHEWS afterwards bought it by private contract, striking out the word "plantations," and leaving the timber to be paid for by valuation. On that occasion, it was set up that larch and Scotch fir, in Wales, was timber at 3 inches quarter girth. The Surveyors' Club, which numbered among its members many old timber valuers in the Home counties, was consulted, and the result was an unanimous assent to the principle laid down by Mr. JOHN CLUTTON's father many years ago, viz., that underwood ceased to be such, and became timber when, at a height of 6 feet from the ground, it had attained a quarter girth of 6 inches. There were many others, also, whose opinion he sought at the time, and he received the same

answer in every case. He thought, therefore, that the point might be looked upon as settled.

The measurement of timber was never geometrically performed, nor was it necessary that it should be. The existing system was well understood both by sellers and purchasers, and he thought that by its means a fair price was arrived at between the parties. Long practice, however, was the only means of ensuring accuracy of measurement. The only way by which the quantity of timber estimated by view could be proved to be correct, was by measuring the timber when down. Thus, the measurement of a tree 40 feet long, might be made in three or four lengths, getting a correct centre girth for each length, and an absolutely accurate estimate of the real solid cubical contents could be made in this and in no other way. Measuring, it should be remembered, had to be done by view where the timber was to stand and become the property of the purchaser; but the difference in the results arrived at by two persons measuring by view was sometimes as much as 2,000 feet in a total quantity of 20,000 feet. He did not know any better plan, however, for the purpose, and, such as it was, its results received general acceptance.

The simplest table for timber measuring he had ever met with, was given to him by the late Mr. NEVE, of Benenden, Kent, many years ago, and would be easily understood after the description given by Mr. WATNEY of the mode of computing the solid contents of a stick of uneven-sided timber. This table gives the square of the quarter girth, which, multiplied by the length, gives the cubical contents. Thus, taking the easiest example, the solid contents, per foot run, of every tree whose quarter girth is a foot, must be 1 foot, and if the length of the tree, of which the mean quarter girth is 1 foot, be ascertained, that length shows the cubical contents—

$$12 \times 12 = \frac{144}{144} = 1 \text{ foot.}$$

In the same way, if the quarter girth be 17, the foot run will contain 2 feet solid measure—

$$17 \times 17 = \frac{289}{144} = 2 \frac{1}{144}$$

and if the girth be 6 inches or $\frac{1}{2}$ foot, the square will be $\frac{1}{4}$, and this tree will contain $\frac{1}{4}$ of the length in solid measure.

Any one who has the mode of computation in his head, and uses this table, for one hour, when at work, will remember, up to 24 quarter girth, the multiplier in every case, and will have no need to look at the table at all, except in measuring very large timber, which is very rarely met with: and if this table be entered into one end of the timber book, no further trouble need be taken, and nowhere else but under the tree can mistakes made as to quantity be set right.

He would very strongly recommend this table to every timber valuer, and intended, therefore, to have some printed and sent to the Secretary to give to any applicants. Mr. RYDE's and other tables were based on the same principle, but made the user of them depend upon others to work the calculation; but if his (Mr. OAKLEY's) table were used, the principle of computation was kept alive by the measurer himself, and very soon became so impressed upon his memory that it would never be forgotten.

Many persons were in the habit of taking the girths and lengths, and of booking both in the field, working out the quantities afterwards. This occasioned very much extra labour, and if a wrong figure were booked the error must remain; whereas, if the computer in the field, his strap man having called 15 and his pole man 20, books 40 feet, he is struck at once, from viewing the tree, with the probability that he is wrong, and immediately discovers the mistake he has made; and if he finds that his result at

another tree, with correct arithmetic, is beyond the measure which his eye gives him, he tests the strap and pole man, and finds out that one of them has made a mistake. He, therefore, advised all beginners to renounce the plan of booking lengths and girths in the field, and to book only the solid contents of the tree.

The Institution was, he thought, very much indebted to Messrs. WATNEY and CLUTTON, and hoped that another Paper would be read, and facts given illustrative of the loss or gain of growing timber with underwood, or showing when all the timber should be cut down,—profit only being the consideration.

The value of timber, as had been pointed out, depended a great deal upon the locality in which it grew, its size, the facilities of carriage, and a variety of other circumstances, which it required many years of practice to become acquainted with. As to the observations of Mr. RYDE with reference to a dormant element of value in timber, he would remark that if any one had an estate for sale, and the timber was to be included in the purchase, and could not be separated,—and if it were, the value of the estate would be reduced to a considerable extent,—it was customary to value it at what it was worth to cut down and sell; and, in such cases, timber could not be valued in any other way than commercially; for to attempt to value it at what it was worth ornamentally would be impossible.

As to the rating of timber, he would observe that, in Herefordshire, the underwood and timber grew and ripened together, and the land was rated higher, owing to the timber being there, than it would be without it.

He quite agreed with Mr. RYDE's observations as to the powerful effect of accumulating interest, and it was too often lost sight of. He had a table in his hand which was out of print (though he believed the Institution

had a copy), compiled a good many years ago by Mr. HORTON, the assistant and clerk of the grandfather of the present Mr. MARTIN NOCKOLDS, and it was useful in this way.

The home steward of every estate where the underwood is sold, annually, by auction, can correctly supply the sum which the auctioneer pays, net, to the proprietor, and the average price per acre produced can thus be clearly arrived at. These tables were calculated at 3, 4, and 5 per cent. interest, and showed in the first line the first annual outlay for rent, rates and taxes, and tithes, and the accumulating interest and annual outlay in each succeeding year. As an example, if it were found that the average produce amounted, when sold, to £10 per acre, and the average period of cutting was 12 years, and it was desired to calculate at 4 per cent., the person using the latter would turn to the 4 per cent. table, and under the column headed 12th year, would pass his eye down till he came to £10, and the sum which he would find under the first year leading up to £10, would be 13s. 6d., which would be the annual value of the wood land less the rates and the tithe (if any), and after deducting the annual cost of the planting. The cost of hedging after a fall should also be deducted; but this was almost universally fixed by the auctioneer on the purchaser of the underwood, who regulated his price accordingly. Putting the rates and taxes at 1s. 6d., the tithe at 1s., and the planting at 1s. 6d., on an average of 7 years, the deduction of 4s. from the 13s. 6d. would show that such underwood as sells for £10 net at 12 years' growth, paid 4 per cent. on a net rent of 9s. 6d. per acre. Planting underwood with oak or chestnut costs much more than 1s. 6d. per acre when such work, in old woods, is first commenced; but after each fall the cost is reduced, and amounts, eventually, to a very small annual outlay. Planted woods,

where they take well enough to be continued, required very small annual expenditure.

Mr. C. CADLE (Member) said that he should be glad to hear Mr. WATNEY's opinion on two points of some importance. The first was whether walnut trees ought or ought not to be valued as timber, it being a disputed point whether they came properly under the category of timber, inasmuch as they were grown for the sake of their fruit alone. If they were grown for timber they would be planted thickly, whereas they were generally studded about near the house. Perhaps Mr. WATNEY could refer him to some authority on the subject. The next point on which he wanted information was respecting timber on glebe lands. Since the alteration of the law of dilapidations several points of dispute had arisen with regard to what should be allowed to the representatives of a deceased incumbent towards the repairs. If he was rightly informed, the Bishop of Hereford had taken counsel's opinion whether timber should be allowed or not, and it had been allowed in consequence of that opinion. This was an important point, and, probably, Mr. WATNEY would be able to throw some light upon it.

Mr. R. B. GRANTHAM (Associate of Council) said that he had no practical knowledge of the growth and management of timber, but he could speak, with some authority, on the effects upon woods and parks, of drainage operations carried on through and about them, and on the mode of draining them. The evil effects of draining in the neighbourhood of trees were reciprocal, as unless the work were very carefully done great inconvenience and expense resulted from the roots finding their way into the pipe drains and choking them, while, on the other hand, there was danger of killing the trees if the land

were drained to excess. He had found from experience that neither pipe nor open drains should be run too close to the trees, and this was especially the case with oak trees. He had been, for some time past, instituting inquiries, with a view to determining the effects of the clearing of forests upon rainfall and floods, and had received, from America, a letter from Professor HORSFORD on the subject. The letter contained, however, no information as to the steps which had been taken in that country towards reinstating the large areas of forests cut down, but hoped, before long, to be in a position to make a communication on the subject to the Institution. He called the attention of the Institution to a Paper read at the meeting of the British Association at Bradford last year, by Professor BALFOUR, who, with a committee, had been conducting experiments to discover the effects of timber clearing, in a part of Scotland, upon the salubrity and also on the rainfall of districts. Valuable information on the points under examination would be obtained, if the investigation were carried out on a sufficiently large scale; but the difficulty, at present, was the want of consecutive observations, and, until these were obtained, in this case and in others, no reliable data were available. He had been recently engaged in an inquiry with regard to the floods in Somersetshire. His attention was directed by the Inclosure Office to the effects which the clearing of the high lands might have had upon the floods in that county. Very little information could be obtained on the point, partly because there was very little land cleared and partly because no observations had been made; but he came to the conclusion that the floods had been very little affected by what clearing had taken place. They were mainly due to the increased drainage of the country and the imperfect outfalls of the district.

Mr. W. V. K. STENNING (Visitor) begged permission to

add a few words to the discussion from a timber merchant's point of view. So far as he remembered, no information was given, either in the Papers or in the resulting discussion, as to the size to which it best paid to grow timber. His own opinion was that no tree paid to stand after it attained the size of about 10 feet, whether grown with underwood or alone. If it stood among underwood it would weaken the plants around it when it attained that size. It was true that a tree of from 5 to 10 feet was not worth so much as one of from 40 to 50 feet; but it did not take very long for a tree of 2 or 3 feet to double in size, whilst it took a long time for a tree of 12 feet, and a very much longer time for one of 40 or 50 feet, to do so. Then, again, a tree of 45 feet growing in a wood, would take a considerable amount of land for its own use, and little or no underwood would grow near it, whereas a tree of 5 or 6 feet would not interfere with the underwood, and the stubs on which the underwood grew would grow as well as the tree. For these and other reasons he held the opinion which he had expressed, and his father and grandfather held it before him. It was declared by Mr. RYDE to be impossible to measure 100 trees in an hour; but the task was, he thought, an easy one for timber valuers of experience, who knew the tables by heart. He had himself measured 200 in an hour with two men to girth, and he found that his measurements approximated very closely to those of the other side. The gentleman who followed Mr. RYDE gave some startling statistics with regard to underwood on a client's estate; but they must not be taken as applying generally to the southern parts of England. That estate was celebrated for the growth of hop poles and chestnuts, and a large number of wattles came from it; but he did not think that Mr. OAKLEY's figures should be taken as representing the ordinary yield of underwood in Kent or in Sussex. Mr. WATNEY did not mention the situation of the woods to which he referred.

In Sussex, where the south-west gales were very severe, timber thrived best in the ravines (or *gills*, as they were locally called), and in the woods sloping to the north. The strongest south-west winds prevailed in the beginning of the month of June, when the very tender leaves were on the trees, and this checked the growth of the wood in exposed situations.

He did not think that the Institution need interest itself about calliper measure; timber had to undergo conversion before that measure was arrived at, and this was the merchant's business, and not the seller's.

HOPPUS was the recognised authority on the measurement of timber, but it had been ascertained that about $113\frac{1}{2}$ inches of round timber measured by his method was a cubic foot, instead of 144, as it should be. To explain this more readily, a piece of round timber, 12 inches long and 48 inches round, would make many more than 144 pieces 1 inch square.

A tree was supposed to make a piece of scantling of the same size as the quarter girth; but it was found that one of 12 inches quarter girth would only make a piece of scantling equal to $10\frac{1}{2}$ inches square.

MR. C. OAKLEY (Member) said that, having had some little experience in the measurement and valuation of timber, he would venture to make a few remarks on that part of the subject. There was no doubt that the customary method of measuring round or standing timber gave a result considerably below that which would be obtained by the correct mode of reckoning the contents of a cylinder. In HORROR's tables, to which his father had referred, an example of both methods was given, showing a difference of about 22 per cent. The usual allowance of 1 inch in 12 in the quarter girth for bark was also considerably in excess of the real difference, caused by the thickness of the

should be a slight error in the case of a particular tree, it would be corrected by the average in dealing with a large quantity. One of the speakers at the last Meeting recommended the use of HOPRUS's tables. He would venture to advise any young beginner to use any tables or scales as little as possible, but rather to habituate himself to rely on mental arithmetic, and, in a short time, with practice, he would find it almost unnecessary to refer to any table except in dealing with very large girths.

Mr. WATNEY's calculation, on page 170, seemed rather formidable; but the square of 36 inches being 9 feet, that figure multiplied by the length 27, gave the result 243. It is now well established that everything is timber which is 6 inches quarter girth, but questions were sometimes raised as to where the girth ought to be taken. About 15 years ago, in Shropshire, he sold to a merchant all the underwood and tellars in a wood which was to be cleared, and agreed on a price, per foot, for the timber, everything at or over 6 inches to be measured down. When he went down to measure, he found the trees cut out to the extreme tops, and the buyer insisted on taking the girth half-way up, and where it was less than 6 inches refused to pay for the tree, although there were several feet of timber in the butt which he (Mr. OAKLEY) claimed, throwing the top under 6 inches in. He referred the question to a local umpire of good position. Mr. CLUTTON, with his usual kindness, was good enough to assist him with evidence as to what was really timber, and where the girth should be taken. The umpire, however, decided that the buyer was under the impression that the timber was to be measured in the middle, and that it was usual in that neighbourhood to do so, and therefore decided the question in his favour, but made him pay (for some incomprehensible reason) £20 beyond the result so obtained.

Mr. WATNEY stated, in his Paper, that it does not pay to use any other than oak bark. He (Mr. OAKLEY) found, however, that larch bark is used in Scotland, and makes a good price, and, he believed, it is also used in Bavaria and the Tyrol.

He happened to have a measurement of the celebrated Panshanger oak (referred to by Mr. WATNEY), made on the 11th May, 1814, by Mr. JOHN HAINES, of Cole Green, giving the detailed measurement of everything over 6 inches, the total contents being 984 feet, or 19 loads and 34 feet. In STRUTT's *Sylva Brittanica*, published in 1830, it was stated to contain 1,000 feet. Mr. WATNEY gave the contents as 27 loads, or 1,350 feet. If these measurements were to be depended on, it appeared that oaks would continue to grow and thrive when they were many hundreds of years old. With reference to growing oaks from stools, he found the following passage in JOHN EVELYN's *Sylva* :—

“It often happens from natural or accidental causes, that planted oaks grow stunted and crooked. In such cases they should be cut down at a proper season. In consequence of this judicious practice a clean leading shoot will be obtained, that will soon overtake the cotemporary trees that have not undergone the same operation. But it must be considered that no oak should be thus headed down till 2 or 3 years after planting, or until it has completely rooted itself in the ground. Many other kinds of forest trees, under similar circumstances, may be treated in the same manner, but we must except all the pine tribe from this operation, as in them the loss of the leading shoot is the certain loss of the tree.”

Mr. RALPH W. CLUTTON (in reply upon the discussion) said that he would make one or two remarks upon Mr.

WATNEY's Paper before considering the observations that had been made with reference to his own.

It was stated by Mr. WATNEY that he used straps which did not allow for the bark, as being most convenient. He (Mr. CLUTTON) found it best to use the graduated strap, which made a proportionate allowance for the bark, because it left the mind unengaged to determine the girth and length above the point of measurement, without having the allowance for bark to calculate.

A price for boxwood per foot was given by Mr. WATNEY; but he (Mr. CLUTTON) had, a few years ago, some box to sell on Box Hill, and was unable to get an offer for it. He understood that the price was generally given at per ton, and he should be obliged if Mr. WATNEY could tell him how many feet went to a ton, and what price per ton he ought to obtain. Mr. WATNEY, in his observations on his Paper, said that for the first 20 years after timber was cut, the underwood would produce nothing or next to nothing, and that it was necessary to replant the underwood, which would require two cuttings before profit would be obtained from it.

His own idea of cutting timber was to clear it while there was still a plant of underwood left: this he considered of some importance. He knew an instance in which timber supposed to be 100 years old, was cut about 8 years ago, and there was now a full plant of young underwood, principally hazel. He believed that hazel recovered sooner than any other kind of underwood, and that, probably, if the wood had been ash, some additional filling up would have been required, but not to the extent which Mr. WATNEY appeared to think necessary.

In the course of his remarks, Mr. MENZIES called attention to the absence of any statements in his Paper with reference to the best area for clearing spaces in woods, and

intimated that his (Mr. CLUTTON's) uncle suggested that 100 yards each way was about the proper distance. Now 100 yards each way was something like 2 acres, and there were very few woods, in the district dealt with in this Paper, of sufficient size to admit of a clearance of such an area as 2 acres, while leaving a good fringe all round, and he thought that if they took a minimum of 50 yards, which would be equal to about half an acre, it would be nearer the mark. The instance referred to by Mr. RYDE, as to the felling of timber at 100 years, was brought forward in this way. He would quote the passage from his Paper:—

“In the foregoing observations I have assumed that underwood sold at £10 per acre is worth a rental of 10s., and that for 60 years the underwood and tellar thinnings together will produce fully 10s. per acre. From the latter period and up to 100 years, when I assume the timber will be fit for falling, little or no revenue will be derived. The rental of 10s. per annum, accumulated for 40 years at 4 per cent., gives, in round figures, £50 per acre.”

This was given to show that, after growing timber and underwood together for 100 years, the timber was worth more than £50 per acre.

He agreed with Mr. RYDE that, when timber arrived at a certain age, the money running against the timber would generally produce more interest than the value of the timber growth. He did not believe that any timber over 100 years old would pay 3 per cent., and he thought that, if they grew timber and underwood together, 100 years was, taking an average, about the proper age at which to cut the timber,—that was, in an ordinary growing country. Mr. STENNING had remarked that he considered when a tree arrived at 10 feet it ought to be cut. He (Mr. CLUTTON) believed that depended a great deal upon the soil in which

it grew. There were some soils in which large timber was grown in a very short space of time. An instance was given in his Paper in which trees known to be only 65 years old, averaged 14 feet. He believed those trees to be growing as fast as they had ever done, and to have reached that stage at which the girth was increased over a very long length (from 25 to 35 feet), and this made considerable difference. If the trees were only of short length, say from 12 to 16 feet, there was a much shorter length for an increase of girth, and consequently a smaller annual increase in dimensions, though the trees might be the same age as those 35 feet long.

Mr. WATNEY, in reply, said that Mr. JOHN CLUTTON, in his remarks (page 209), had, he thought, properly defined the difference between timber and underwood. He was reminded of a case which occurred in Monmouthshire some years since, when he marked, with the underwood, in a large wood, a great number of surplus tellars and small trees up to the size of 6 or 7 feet per tree. He was selling the underwood by order of the Court of Chancery, and an objection was raised by the remainder-man that these tellars and small trees could not legally be cut. He, therefore, obtained affidavits from local men to prove that this setting out was in accordance with the usage on the estates of the Duke of BEAUFORT, and throughout the neighbourhood generally, and the court authorized the sale. He was glad to find that Mr. OAKLEY had confirmed that view, and he agreed with that gentleman that the practice which prevailed in the counties of Hereford and Monmouth, of growing and selling timber and underwood together, answered remarkably well. He could not agree with Mr. MENZIES, that trees only ceased to be thinnings and became timber when they had attained a cubical content of

20 feet; and he was glad to find that Members generally endorsed his view, that a tellar became timber when it had reached a quarter girth of 6 inches under the bark. He had been asked a question by Mr. CADLE respecting walnut trees. It had always been his practice to treat them as timber, and he believed that it was customary to do so, the reason being, probably, that half a century ago they were so valuable for gun stocks; indeed, he was informed that they were sold at that time for as much as 8s. per foot. With regard to Mr. CADLE's other question as to timber on glebe lands, he might mention that, a few weeks since, as agent for the patron of a living, he was told that the archdeacon or rural dean had authorized the incumbent to cut timber, not only for repairs, but for new buildings. He (Mr. WATNEY) demurred to his doing so; but it was stated to be the law, on the authority of counsel's opinion taken upon the subject by the Bishop of WORCESTER. A great deal had been said, in the discussion, about the measurement of timber, and he had prepared a diagram, showing a section of a tree, from which the mode of measurement he had described in his Paper would be better understood than from any description.* He assumed the tree to be 20 feet long, and to have a diameter of 24 inches in the middle of the butt; the diagram would show the result according to the various modes of measurement to which reference had been made, namely—

Quarter girth,
True content,
Die-square,
Squared oak.

The latter was the only method which required any explanation. As he stated on page 172 of his Paper, the

* This diagram will be found after page 242.

rule for hewing English oak timber for Her Majesty's dock-yards was—"The timber to be so hewn or squared that at each of the measuring places the *pane* (that is, the portion of the tree hewn off with the axe) shall not be less than one quarter of the diameter of the piece." In the diagram, the panes or pieces that were hewn off were shown in black, and it was obvious that the square taken by the callipers included the spaces lightly shaded on the diagram, and was altogether an erroneous mode of measurement.

With regard to straps, he objected to those which allowed for the bark, and his reason was this:—For the measurement of oak timber, a strap which allowed for the bark answered very well, but in the case of all other trees (except elms) the allowance had to be added again, and for general practical purposes he preferred a strap which gave simple dimensions.

He had been asked a question about boxwood. He expected to have heard something about the price of box from Mr. CLUTTON, considering the large amount of that wood grown on Mrs. HOPE's estate near Dorking. But as regarded its weight, he observed that Mr. RYDE's table gave it as 60 lb. per cubic foot. He certainly disagreed with Mr. RYDE in his remarks about measuring timber. As he had explained in his Paper, there was no royal road to timber measuring; and, although Mr. RYDE characterised it as the roughest of all processes, it required a great deal of experience and judgment, and he believed that no one could be an efficient timber valuer unless he was thoroughly fond of it. Mr. STENNING had told them it was easy to measure 100 trees per hour. He (Mr. WATNEY) had often done it, and with less dissatisfaction to clients or timber buyers than Mr. RYDE appeared to suppose.

Surprise had been expressed by Mr. BROWN that nothing was said in his Paper about bark; but he had

endeavoured to confine himself, as far as possible, to that which related to standing timber; and it was, he believed, generally understood that the lop and top and the bark of oak trees should pay all the expenses of felling and carriage. He had taken considerable pains, since the last Meeting, to ascertain the average yield of bark, per load of 50 feet, from oak timber. His own opinion, as stated on page 176, was that a load of oak, in Sussex, would produce from 8 to 9 cwts., and in the eastern counties from 6 to 7 cwts. Against that, however, Mr. WEBB stated that in Kent, on good soils, the yield was commonly from 13 to 14 cwts., and on ordinary soils 11 cwt.; but he (Mr. WATNEY) might perhaps account for this, by reminding Members that by the custom in Kent the spire only of the tree was measured, so that in a tree of 75 feet, by that mode of measuring, a limb of, perhaps, 12 to 18 feet, which in other parts would be measured, was thrown in. Mr. CLUTTON, again, had said that he had known four loads of timber yield $2\frac{1}{4}$ tons of bark, or $11\frac{1}{4}$ cwts. per load. He was indebted to an eminent timber merchant for the following information; but he refrained from giving his name, because such details were to a timber merchant a vital point as to profit or loss, and trenched somewhat upon his business interests, although he agreed with him that it would be greatly to the benefit of those in the timber trade if more accurate and certain data were possessed by the viewers and valuers of timber, seeing that there were so many circumstances affecting the value of timber, such as the situation, the carriage, the quality of the wood, the quantity of the bark and tops, and the price they were likely to realize. For if valuers, generally, were conversant with such details, and were desirous of allowing a fair margin to the timber merchant for profit and risk, the difficulties attending the sales of timber by private contract would be very much

decreased, and the land-owner would reap the benefit. He would quote his informant's own words :—

“Produce of Bark per Load of Timber.—In speaking of the quantity of bark produced from a load or 50 feet of oak timber in different counties, you must take *the average of the whole fall during the season, and not any particular lot of timber.* In Surrey and Sussex, for instance, small timber grown singly in hedge-rows, with short bodies and large heads, would probably produce from 12 to 14 cwts. of bark per load (but it is very rare to obtain so large a produce); but most probably on the very same estate, and growing in a coppice adjoining, timber standing close together would not produce more than about 7 cwts. of bark to the load of timber. Many years' experience as a timber merchant have proved to me that, taking the average of the counties above named, 6 loads of timber would produce a load, or 45 cwts. of hatched bark, equal to 50 cwts. (about) of bark in the rough state, or an average of $8\frac{1}{3}$ cwts. per load of timber.”

With regard to the allowance for bark, he might mention that in very rough elm he had frequently allowed $1\frac{1}{2}$ inches per foot on the strap, and this, in some instances, he did not think any too much.

As to the per-centage which standing timber paid, he might say that he, personally, quite agreed with Mr. STENNING that young trees paid a higher per-centage than large trees; and he quite agreed with him, also, that in managing woodland the greatest value in the long run would be realized by cutting timber early, and not allowing it to remain to arrive at what had been stated here to be *maturity*. With reference to this point, he would refer to some figures given to him by the same gentleman whom he had before quoted:

“Increase of Growth.—The various speakers seem to me to have omitted one important element under this head in giving their opinion as to the per-centage standing timber

pays. In my opinion you should start from the commencement of the growth of an oak tree,—say when valued as a tellar at 1s., or, otherwise, when a tree becomes timber, that is when it is 6 inches quarter girth, or in coppice timber, say about 5 feet average per tree, worth say £4 10s. per load; when these trees have grown to an average of 12 or 13 feet they would be worth £5 10s. per load, thus increasing in value at a bound £1 per load, or about 5*d.* per foot in addition to the increased value by reason of the growth in feet. When they arrive at about 25 feet average they would be worth £6 10s. per load, another rise of £1 to be added to the value per foot on the increased growth; at an average of 40 feet per tree, they would be worth another £1 per load, making £7 10s. By starting at one price per load, as many speakers have done, and maintaining that price throughout the calculation, you only have the increase obtained by reason of the growth of the tree, not the larger and increased value of the tree per load, which ought to be added to obtain a correct estimate of what per-centage timber will actually pay.”

Forest and tree culture was another subject which he thought might receive much attention. In the United States there had been a report upon this subject recently furnished to the American Department of Agriculture, and he quoted from an article upon it:—

“Unquestionably one of the most important questions engaging the attention of the American people is that of forest culture. The demands of our rapidly growing country have, for many years, so drawn upon the resources of our native forests, which at one time seemed inexhaustible, that we must now contemplate their early extirpation, and address ourselves to the task of conserving what forests we have remaining and providing new sources of supply. Much has been written on this subject, but so difficult is it for us to realize the bearing of remote evils, that comparatively

very few farmers or land-owners have yet seriously engaged in the work of replenishing these woodlands. The arguments for this work are strong and numerous, and have been cogently presented by many writers. Many facts have been observed which appear to show that the presence of forests has much to do with the climate and rainfall of a country; thus it is said that the extreme dryness of Spain is due to the absence of trees; that many districts in France have been materially injured by denudation; that Palestine and many other parts of Asia and Northern Africa, which in ancient times were the granaries of the world, are now deserts or infertile regions, in consequence of the loss of these forests. It is also stated that a beneficial change in climate and rainfall has in several instances followed the introduction of trees and plantations in regions that were formerly destitute of them. Thus it is said that in Lower Egypt, where, anciently, rain never fell, the introduction and cultivation of extensive plantations have been attended with the fall of a good deal of rain, so that showers are now no rarity even at Cairo. It is also affirmed that, in New England and other wooded sections, the clearing up of forests and cultivation of the soil have had the effect of causing the drying up of many springs and small streams. There are some who doubt the correctness of these conclusions with respect to the climatic influences of forests; but as these influences must be of very gradual operation, and require observations over a long series of years, the question may be open for future inquiries."

Again, to follow up what Mr. GRANTHAM had said this evening. Trees, like hills, were known to affect the rainfall, and their presence or absence would even change the sanitary condition of a locality. The Rev. GILBERT WHITE, in his *Natural History of Selborne*, gives an interesting account of the manner in which trees absorb moisture from the atmosphere, and of the benefits which they thereby

confer on the land. More than 100 years ago he referred to the effect which the clearing away of forests had even then had in diminishing the lakes and waters of certain parts of North America, adding that "some streams which were very considerable a century ago, will not now drive a common mill." If this were the case in GILBERT WHITE's time, what must be the state of affairs now? The clearing of superabundant woods was unquestionably a great benefit, but, if carried to excess, was likely to become an evil; and where the presence of water or moisture was a desideratum, the influence of trees in affecting its supply must be a principal item in the calculations of those who have woods to maintain or vacant places to plant.

The question of replanting (as connected with the great floods of the Rhone) had very much engaged the attention of the government of France, and also that of Italy, as connected with the floods of the river Po. In the spring of 1873, a Bill was introduced into the Parliament of Italy, framed with the view and object of replanting the high lands which had become, from various causes, denuded of the timber, and to which denudation had been ascribed to a very great degree the flooding of the valley of the Po. The main object of the Bill was to encourage the replanting of these high lands by individuals who would have been entitled to purchase them from the Commune, at a low rate, for that purpose. The Bill was not passed, and the subject was in abeyance so far as legislation was concerned; but the minister who introduced the Bill, adduced scientific reasons and data to show the advantages of such replanting.

He should have liked to refer more at length to foreign timber and, having been over, professionally, very large tracts of the forests in the south of Norway and Sweden, he could give many facts and figures; but he felt that this Paper and the discussion should be almost entirely

devoted to English timber; and, perhaps, some other Member would write a Paper on the subject.

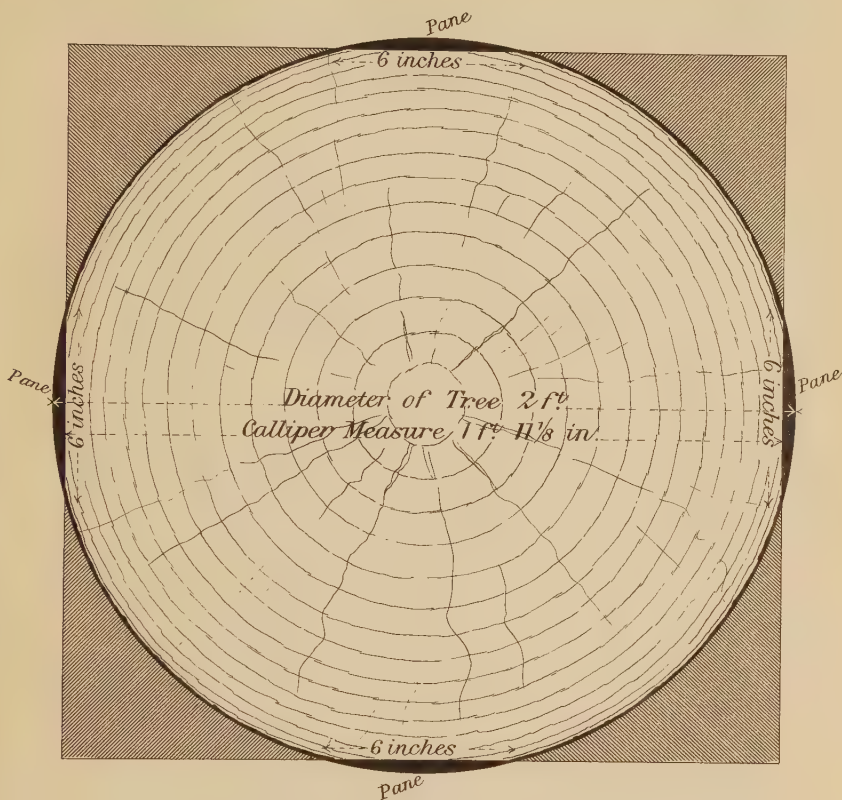
Mr. W. BROWN hoped that it would not go forth, with regard to lop and top and bark of trees, that they were allowed for the expenses of felling and carriage. In his own case, he did not himself remove the timber from where it was felled, and he thought it incorrect to say that the bark paid for felling.

Mr. WATNEY said the ordinary way, in Mr. BROWN's immediate neighbourhood, was not to measure or sell the timber standing, but to sell the tops separate from the butts. Mr. BROWN also assumed that if trees were valued standing, with the bark on, and a certain price obtained per foot, such price should be distinct from the bark, which, when the trees were felled, was stripped off. In his own opinion, the bark and lop and top of oak trees would generally cover the cost of felling and carriage, and the plan suggested by Mr. BROWN would entail great difficulties in practice.

The PRESIDENT said that he could not but feel grateful, and he was sure that the Meeting concurred with him, to Mr. CLUTTON and Mr. WATNEY for the able Papers they had read. They had greatly interested him, and he felt that, in common with others, he had derived a great deal of useful information from them.

The Meeting then adjourned.

Plan to accompany Mr. Watney's Paper on Timber.



*The above Tree 20 ft long by 24 inches Diameter
will give the following results.*

<i>By Quarter Girt</i>	<i>49 FT CUBE</i>
<i>True Content</i>	<i>62 " "</i>
<i>(17 Inches Square) Die Squared</i>	<i>40 " "</i>
<i>Squared (Calliper Measure)</i>	<i>74 " "</i>

THE MANAGEMENT OF THE FORESTS OF FRANCE.

Report to the National Assembly, made by M. le Vicomte de Bonald, in the name of a Committee appointed to consider the expediency of transferring the Management of the French Forests from the Finance Department to the Department of Agriculture.—November 1872.

GENTLEMEN,—In the sitting of the 27th June, 1871, the National Assembly referred to us, for examination, a report, in which the Fourth Commission, having for its object to acquaint the National Assembly with the general condition of the public works, agricultural improvements, and hydraulic arrangements of the country, concluded by recommending that the chief management of the forests should be transferred from the Finance Department to that of Agriculture and Commerce.

This is not the first time this important question has been raised. The report, which now brings it before the Assembly, represents an opinion of long standing, and which year by year gains strength. It only repeats and solemnly affirms the desire expressed, long ago, by well informed and competent men, by all agricultural societies, and by a great number of the “conseils généraux.”

As far back as the year III. M. FORFAIT, then Minister of Marine, represents the annexation of the forests to the Ministry of Finance as a dangerous measure, and in the year IV. we find in a report, presented to the Con-

vention (against the union of the forestal management with the "Régie de l'Enregistrement,"* which had followed the suppression of the old "Maîtrises"† of woods and waters), these words, that "a fiscal management is not naturally a preservative one, and that it is the object of forestal management to preserve, to reproduce, and to improve, and that it requires, as agents, men who do not look at forests from a financial point of view."

Since that time, the incompatibility of proper forestal management with financial rule has been repeatedly maintained and explained. The agricultural inquiry of 1867 gave this opinion fresh force by showing with what unanimity it was held. In 1869, the Agricultural Congress of Nancy; in 1870, the Agricultural Society of France, requested emphatically that the management of the forests should cease to belong to the Ministry of Finance. The "Société Forestière"‡ pursues the same object, and the "Réunion des Agriculteurs libres de l'Assemblée Nationale" decided almost unanimously, in the same sense, not many months ago.

Now, is this current of opinion justified by the present state of forest management under the Ministry of Finance, or is it the result of mistaken views?

Is it desirable to follow it, or will it be wise to resist it?

In order to answer these questions, we must consider carefully (1st) what importance a State ought to attach to forest property, and (2nd) whether it is desirable that the State should possess such forest property.

The forest question may be looked at from two very

* A branch of the financial administration under the French Republic.

† Local offices under the "Ancien Régime," which had charge of the public forests in each province, presided over by forest masters (Maîtres des Eaux et Forêts) who exercised extensive magisterial powers.

‡ The French Society of Foresters representing the special interests of forest property in France.

different points of view,—the forestal or agricultural one, which has also, as we shall see, a social aspect; the other, the purely financial view of the case.

Are forests a property which it is important for the public interest to preserve, and consequently to improve?

Or are they, on the contrary, merely intended to furnish a contribution to the Budget, till the day comes when, to meet financial difficulties, the capital which they represent will, itself, be needed?

To foresters, to agriculturists, and to a great many able administrators, the first hypothesis is an incontestible truth.

A certain number only of economists admit the second; and the Ministry of Finance, in general, inclines towards it.

Now it is evident, that according as the one or the other of these two hypotheses is adopted, should the management of the forests be entrusted either to a financial authority or to that of an “Administration Culturelle.”*

Let us first of all examine whether there is not in forest property a peculiar character distinguishing it from all other kinds of property, a character affecting the public interest, and so justify the assertion of M. LE PLAY, “that a country destitute of forests, is not only deprived of its fairest ornament, but also of an indispensable resource;” and that of a German economist, M. ROSCHER, that “forests should be worked in the interest of society in general, and not in that of the Treasury.”

We shall examine, secondly, whether the circumstances under which forestal management is now carried on, enable it to accomplish its true object.

We will then estimate the value of the reasons adduced for its union with the Ministry of Finance.

* A branch of the public administration, which has for its object the development of the natural resources of the country.

I.

Those who maintain that the public forests should not be alienated, have often advanced the argument that they ought to be kept intact as a guarantee for the creditors of the State,—this argument we may leave aside. The economic science of the present day would contest it; and, it must be owned, besides, that with a debt so large as that of France, such a pledge would have but small value. The real guarantee for the creditors of the State is national labour,—it is on our manufactures, our commerce, our agriculture, that the credit of France rests, that credit, still powerful in the midst of our misfortunes,—as we have just seen; and it is in our power, by prudence and union, to make it indestructible.

We will not dwell either on the influence attributed to forests on the climate or the rainfall, the superficial and underground drainage, and consequently on the public health and on agriculture.

This influence used to be universally admitted, but we will not hesitate to own that it has latterly been disputed, and perhaps justly, by very competent men. If it does exist, it is more local than general, and varies according to the geographical position of a country, its geologic formation, its latitude, its nearness to or distance from, the sea, the nature of the soil and subsoil, the aspect of the forests with respect to prevailing winds, and the kinds of trees of which they consist. The real influence of forests on the climate of a large country cannot be demonstrated.*

We may say the same of the effect of forests in a meteorological point of view, for it is not proved that the

* See *Études sur les Torrents des Hautes Alpes*, par SURELL et CÉZANNE.

popular opinion which connects variations in the rainfall with the cutting down of woods is well founded.

It is not certain, either, that the amount of spring water has always been diminished by it.

On all these points science cannot as yet be positive ; observations are incomplete and sometimes contradictory ; the debate is still being carried on, but we can maintain our point by arguments strong enough to dispense with the support of unestablished theories.

We may, however, be allowed to state, that if recent discussions have somewhat shaken the opinion hitherto so generally held on the points just indicated, and yet maintained by many learned and competent men, still the opposite opinion is far from being established with any certainty ; that it was first propounded at a rather suspicious moment, (only dating from the time of the proposal to alienate the public forests in 1865,) that doubts were raised, but nothing more, and that when questions so vital to a country, so important to public health and to agriculture as the modification of climate, the regularity and quantity of the rainfall, and the abundance of springs, rest on mere doubt, it would be highly imprudent and dangerous to condemn our forests in a hurry.

Let us not forget that the old, and as it still is, the popular opinion, has found expounders such as HUMBOLDT, BOUSSINGAULT, and, more recently still, the learned M. BECQUEREL, who, in a report to the Académie des Sciences, of May 1865, maintains that the prosperity of a country is closely connected with the preservation of its forests ; that in Europe, in Asia, and even in America, regions once the most fertile, and now the most barren, owe this change entirely to the disappearance of considerable masses of forest, and that the neglected or destroyed forests of France have gradually become the "Landes" of Brittany, the

barren wastes of Champagne and Poitou, and the marshes of La Bresse, of Forey, of Sologne, and of the Gâtinais.

But, we repeat it, the only part of this argument, so long considered decisive, to which we wish to call attention, is this, that it is a case of doubt, and that until science shall have solved the problem, prudence, good sense, and the most common foresight, demand that the doubt should be construed, for the present, in favour of the forests.

That which cannot be doubted, is, that by their restraining action on torrent waters, they, to use the words of M. DE CÉZANNE, preserve the mountains, present the most formidable obstacle to the hollowing out of ravines in the slopes, and, consequently, the most effectual means of retaining vegetable earth on the surface of hills, which, otherwise "left bare and exposed to external action, would soon be reduced to a rocky skeleton, offering to mankind only barren and uninhabitable heaps."

MM. SURELL et CÉZANNE have completely cleared up this point in their fine work on the torrents of the Hautes Alpes. They have proved that the influence of forests on the preservation of the soil of mountains admits of no dispute, and, confirming the labours of their predecessors by numerous fresh observations, they have clearly demonstrated the truth of the following axioms:—

"That the presence of a forest on soil prevents the formation of torrents."

"That its destruction gives up the soil to their ravages."

"That the growth of forests brings about the cessation of torrents."

"And that the felling of forests revives extinct torrents."

In Switzerland, these facts are considered so certain that the Committee of the Congress for the Advancement of Social Science, which met at Berne, in 1865, introduced into its programme an inquiry as to the influence exercised

by the control of woods and waters in the high lands of Europe over the low lands, and whether it might be possible to establish a common legislation in different countries depending on the same river, so as to protect their respective interests.

It is easy to perceive how trees growing on the soil, penetrating and interlacing it with the thousand fibres of their roots, consolidate it, whilst at the same time their leaves and branches break the shock of the rainstorms.

Their stems, their suckers, the shrubs which grow beneath them, the plants of all sorts, and the turf they shelter, the brushwood which extends wherever man has left a spot untouched by spade or plough,—all these oppose an insurmountable resistance to currents which would otherwise undermine cultivated or merely open land. The soil, naturally mellow, acquires a covering which, slowly permeable, divides and disperses the currents over its whole surface, thus preventing the concentration of the rain-water, and the damage it would do if allowed to run freely over smooth surfaces of bare soil.

These ideas, so well explained by the authors just quoted, have not been contradicted; it is unanimously allowed that in mountainous countries, the preservation of forests is a public interest which must not be neglected by the State. By the recent laws on replanting and turfing* the lawgiver has acknowledged that no better means of protection against the devastation of mountains could be found than those pointed out by Nature herself—that to the actively destroying forces, must be opposed actively preserving forces, which hold back the soil ready to crumble away, and which even recover that which has been carried off, living forces which increase in energy and power, whilst

* Loi sur le reboisement des Montagnes, July 1860.

Loi sur le gazonnement des Montagnes, June 1864.

inert obstacles, erected at great expense, are destroyed and disappear. But, if it is advisable to recreate them where they have ceased to exist, can it be needful to prove that they should be *preserved* wherever time and the hand of man has still left them in existence?

What we have here asserted of the hydraulic action of forests, is evidently applicable only to mountain forests, and not to those on level ground, and tends apparently to confirm the radical difference, which it has been attempted to establish between the one and the other, making out that the latter have only a private interest, and that the first only concern the public.

But the question has other aspects, and woodland property other features of public interest, which are as applicable to lowland forests as to mountain ones, and perhaps even more decidedly marked in the first of these.

Forests are required to supply a want of primary importance, by furnishing for consumption a material of absolute necessity—wood, for heating purposes and for manufactures.

The production, in sufficient quantity, of every object of primary necessity for existence, surely affects the public interest, but all production is not governed by the same conditions, and if in most cases individual enterprise is sufficient, yet in others it may be powerless. Society may rely upon it for meeting all demands which can be satisfied as soon as they are made known, or shortly after; but can it expect from it, with any certainty, productions whose slow growth requires a spirit of continuity unattainable by single individuals, and sacrifices, not to be rewarded for one, or perhaps many generations?

“It is especially in this point,” says M. CLAVÉ in his *Treatise on Forestal Economy*, “that the production of wood is markedly distinguished from agricultural produc-

tion; a few months are sufficient for the seed corn to sprout, grow into blade, ripen in the ear, and be delivered to the trader as bread, corn, or forage. Under such conditions it is easy for agriculture to provide for all casualties, and devote itself specially to that branch which returns most profit; that is, what society most needs. The laws of demand and supply here form an infallible regulator.

“Nothing of this kind applies to ligneous production, on account of the time required to mature the qualities for which they are in request. Nature requires from 20 to 25 years to produce the log which blazes on the hearth; from 150 to 200 to elaborate the keel of the vessel which carries us, or the beam of the roof which shelters us. These productions are the work of time, therefore the laws of demand and supply become powerless to guarantee to society a continuous supply of them. How can we wait for the demand, when the supply, in answer, cannot be offered for a century or two later?”

To ask individuals to plant forests requiring centuries for their growth, in order to provide their country with timber for building; to hope that many generations will respect, for their whole lives, this, to them, unproductive capital, in order that on some later day society may find on this soil, from which they have received no income, those giants of the vegetable kingdom, the wood of which is indispensable to its wants, but which it requires centuries to produce in the quantity, quality, and size required; to suppose that the generation which found this accumulated capital would not hasten to convert it, and then enjoy the revenue of the freed soil: this would be to expect the impossible, and to ignore all the natural impulses of man, especially at the present time, when the desire of enjoyment is excessive, and in a country where habits as well as laws, encourage the division and rapid transfer of property.

But, admitting that the State, as an everlasting proprietor, will alone maintain a rotation sufficiently long to raise trees capable of furnishing large timber, we must then also attribute to the forests in the plains the same character of public utility which, for other reasons, we have claimed for those situated in mountainous districts.

The lowland forests,—and we here include those growing on low hills and undulating ground, as well as in the valleys and on the more gentle slopes of mountainous countries,—are in fact the only ones which, from the quality and depth of the soil in which the trees are rooted, can produce timber of the largest size. The resinous trees, which grow in mountain districts, produce, as a rule, only a second-rate article unfit from quality and size for large naval or military constructions, which only find in the plains the kinds of timber they require.

DUHAMEL says, in his *Treatise on the Management of Woods*, “it is not possible to find on arid and hungry land trees tall enough and strong enough to furnish large and useful pieces of timber;” and this opinion has not been opposed, so far we know, by any forester or agriculturist.

The valuable kinds which are indispensable to manufactures, and for naval construction, the hard-wooded and tap-rooted trees, cannot prosper on rocky ground; the oak especially, of which it is truly said that “its preservation is of the greatest importance to the public interest,” requires, to attain its full size, if not level ground, yet gentle slopes, low altitudes, and deep soil.

Thus, for reasons borrowed from two different trains of thought but of equal value, we are able to reject the distinction asserted to exist in respect of public interest, between the forests on high and on low lands.

It is true, however, that as concerns the latter of these, arguments may be brought forward arising out of economic

doctrines, true in themselves, but which we consider in-applicable to this case on account of the peculiar conditions of ligneous production.

Let us admit, say some economists, that we cannot depend, either on private woods or State forests in mountainous districts to supply us with timber of the quality and size required for the public service and the national industry, and that we can only expect them to provide us with firewood, or timber of inferior quality and size. Foreign countries will always supply our large timber,—they can grow it cheaper and more easily than we can. Land which, under the plough, would be more productive shall not be condemned to yield a scanty revenue from wood, and thus we shall not violate the fundamental principle of economic science, which requires that every acre shall yield the utmost it can produce, and that each country instead of persisting in growing all it needs, should rest satisfied by producing that which costs the least and brings in the most, leaving to trade the care of distributing to all the things necessary for all, and to secure to each the largest possible income.

We admit this doctrine, but we demur to its applicability to forestal property.

This doctrine is quite true so long as there is a certainty of being able, with the money-yield of our own land, to procure the produce of other countries necessary to satisfy given wants. But if, on the one hand, such produce is indispensable, and if, on the other, there are good reasons for doubting whether foreign countries will always yield a sufficient quantity to supply on favourable terms the deficiency of the home production, would it then be wise to risk so dangerous a failure? The effect would be irreparable, bearing, as it would, on a material of primary importance, subject not only to conditions of slow production but also

to special laws. It is an almost invariable economic law that consumption stimulates and increases production,—in other words, demand produces supply; but in the case of timber this law is reversed, and the more timber is consumed the less is produced. The reason of this is, that wood is a natural production; that far from endeavouring to increase it by labour and cultivation, men endeavour, on the contrary, to substitute for it some crop which shall bring in larger and more rapid returns; and if they do not actually clear it away they cannot resist the temptation of discounting the future returns by over frequent fellings, or by the conversion of high forest into coppice, thus diminishing the capital value of the growing stock.

Are not these doubts as to the future of our ligneous production *à priori* well founded? But when leaving theory, we study the facts connected with the question, these doubts turn into serious fears, and the words of COLBERT are involuntarily remembered—"France will perish for want of wood."

We must not forget that the causes we have mentioned, as preventing private property, left to itself from securing a certain and sufficient supply of wood and timber, apply not to France only, but to all countries: that in all manufacturing countries, in England, in Belgium, in Holland, as well as in France, the demand for wood increases in a rapidly ascending scale, and that these countries, nearly stripped of timber, seek it in all parts of the world; so that by a necessary sequence the number of timber-producing countries will diminish as they have to supply more numerous demands upon them. Italy, Spain, and Greece are bare of wood. The greater part of Europe can only reckon on the produce of the Scandinavian countries, who deliver it already at some points in America, and export timber even to Australia. But in these northern States

the progress of civilization and of manufactures brings with it an enormous increase of local consumption: there, as in Russia, wood stands in lieu of coal, of stone, and even, in some cases, of iron.

Then, again, these forests vegetate slowly, their management requires rotations of greater length, and the produce is consequently more restricted. If we may believe M. BROILLIARD, the author of an excellent article in the *Revue des Deux Mondes* on the scarcity of timber, the soil of Norway produces, in a given time and on a given surface, five times less wood than that of France, whilst the consumption per head of the population is five times greater. The same writer remarks that both Sweden and Norway are already considering their forestal prospects. He tells us that the Central Administration of Forests, in Norway, owns that the working has reached its furthest possible limit and, perhaps, has even gone beyond it; and, as to the state of the forests in Sweden, he quotes a Swedish *savant* who, at the Exposition of 1867, declared, on the strength of official documents, "that the value of timber exported now is equal to the total value of all the exports of Sweden 15 years ago; but that from the manner of working the forests, so large an export is not compatible with their future maintenance."

The same writer thinks we cannot rely much upon America. Northern America will soon consume the whole of her own forest produce; the United States require more and more from Canada, and the question of the wood supply already occupies some of the older States. As for South America, it would be mere illusion to expect it to prove a real resource. Her vast forests, inaccessible to commerce from their situation so far up in the interior of the country, and from the tropical climate, deficient besides in useful kinds, are rapidly diminishing, and are destroyed by fire

wherever the coffee planters wish to clear large tracts for the purpose of cultivation.

Prices rise, therefore, from year to year. The price of oak, in particular, has doubled in 30 years, and unless its present rate of increase slackens, we may reckon that in about half a century it will be quadrupled.

The general diminution of timber out of France as in France (noticed by M. THIERS in the Tribune of the Corps Legislatif, in January 1870,) is a proved fact, and we must acknowledge with the writer whom we have already quoted, that "the production of timber (*bois d'œuvre*) will soon cease to be a local or even a national question, and tends every day towards becoming an European one."*

Now this European question is vital as concerns our trade, our manufactures, our navy, which we cannot leave at the mercy of foreign supplies which might fail us in time of war. For all society it is a question of existence. As early as 1862, M. LAPPARENT, director of naval constructions and timber supply to the navy, pronounced it to be a social question of the first importance.

The use of coal, and the introduction of iron into buildings, seemed a few years ago to reassure us, and for a long time this argument was used to allay the fears aroused by the diminution of timber. Facts, however, have come to refute it.

Though iron is substituted for wood in building, and in some trades to a very great extent, the consumption of wood has never ceased to increase, and in the last few years our imports of timber have risen immensely. Here is a statement of our imports and exports for a period of 15 years.

	Importations.	Exportations.
1855 . .	70,900,000	9,800,000
1869 . .	187,600,000	38,800,000

* *Revue des Deux Mondes*, 15 Sept., 1871.

It appears from this comparison that the excess of our imports, which was 61 millions in 1855, had surpassed 148 millions in 1869 ; and that if we take into account firewood and charcoal, of which we imported 3 millions' worth in 1869, and exported rather under a million, the excess of our imports over our exports reached, in 1869, the sum of 150 millions.*

In the amount of our imports, oak stands for 34,000,000 in round numbers. We export none. Now we must not lose sight of the fact that the production of oak, a timber absolutely indispensable for certain kinds of work, is the true criterion of our forest resources.

If these figures were not sufficient to reduce to its true value the argument based on the substitution of coal and iron for wood for certain purposes, would not the coal crisis which has occurred in England, and whose rebound has been felt in France, warn us sufficiently that to seek there for a solution of the timber question would be highly imprudent? Accidental and temporary circumstances have no doubt complicated this crisis, and given it an exceptional intensity : it is not the less true that the alarm excited by the opinions of very competent men, as to the possible exhaustion of English coal mines, and the uneasiness which resulted from such an idea throughout the country, was its starting point.

An increase of more than 50 per cent. in the price, and a deficit in the production, of which we possess no official return, but which has been sufficient to bring some English works to seek coal in the French market, and which has caused the resumption, in some places, of the process of iron smelting with wood and charcoal, is a very serious fact. It is impossible not to attach great weight to it when we

* Exotic and dye woods, and those used in cabinet making, are not included in these amounts.

study the question of ligneous production, as looked at by a country which, like France, consumes one-third more coal than it produces, and which paying tribute to the foreigner for 150 millions' worth of wood every year, does the same for coal to the amount of more than 100,000,000.

But, even admitting the transitory character of the coal crisis, and supposing that the improvement now beginning will (which is, however, most improbable) continue so far as to bring down coal and iron to their former prices, it is quite clear that we cannot depend on their use for diminishing the consumption of wood. This has increased, and will continue to increase, from the operation of causes which act far more rapidly than the substitution of iron for wood. Iron can be made to replace wood in certain manufactures only, and for special uses, timber having qualities which make it indispensable in others, and allowing no other material to supply its place.

It is difficult to form an idea, even approximately, of the enormous amount of wood annually consumed in France.

M. TASSY, "Conservateur des Forêts," estimated it thus in 1851 :—

	Cubic metres in bulk.
Military and mercantile marine .	160,000
Artillery and engineering . . .	45,000
Railroads	360,000
Building trades	1,600,000
Cooperage	1,600,000
Posts, props, and sticks for vine- yards and gardens . . .	2,000,000

M. LAPPARENT, quoting these statistics, observes, that "it does not include the *bois de sap* imported. It is besides," he says, "a minimum—1st, because it estimates at too low a figure the consumption by railroads, and then because it does not take into account pit props and other

wood used in mines, for the building and repairs of barges and river boats, for hop poles, for cart building (*charronage*), &c.," and he does not hesitate to adopt the estimate of M. BURAT, Professor of Commercial Statistics at the Conservatoire des Arts et Métiers, who carries up to 10,000,000 cubic metres the annual consumption of wood for building and trade purposes, to which must be added 30,000,000 "stères" * of firewood, and 15,000,000 of charcoal.

But M. LAPPARENT wrote in 1862, and has not the consumption greatly increased since then ?

Among the many branches of industry to which this is owing, we will only call attention to two. The development of the wine-growing trade requires every year an increase in the number of staves (*merrains*) required for making the casks of all sorts, in which France exports abroad and distributes at home her wines and brandies; and, for this purpose, oak is almost exclusively employed. Not only is it that wine can only be safely moved in oak, but these little boards, which we call "merrains," can only be made out of large trees. The staves we produce at home are far from supplying our wants. Before 1857, we bought abroad, on an average, about 20,000,000 staves, valued at 14,000,000 francs; in 1869, the excess of our imports over our exports has been of more than 50,000,000 staves (*merrains*), representing a value of 36,000,000 francs.

The estimates of M. TASSY and M. LAPPARENT, of the quantities of timber absorbed by railroads, were perhaps correct in 1862; now they fall far below the truth. The mere renewal of the sleepers on which the rails are laid, requires an enormous quantity of wood. These sleepers last, on an average, 10 years; to renew them at this present date, would absorb, for all our railroads, nearly 300,000

* "Stère" is a cubic metre of materials, which are stacked, such as firewood.

cubic metres, will require 1,000,000 when France is in possession of her complete system (*réseau*); and will exceed that quantity if, as may be naturally expected, local and departmental railroads increase in proportion to the commercial and industrial activity of our times.

These figures take no account either of the sleepers (*traverses*) required for the laying of new lines, or of the woodwork employed in the construction of tunnels and works of art (*travaux d'art*), or of those employed in the rolling stock and the various buildings connected with the railways.

M. CHARLES BROILLIARD, in the *Revue des Deux Mondes*, estimates the consumption of oak alone, thus:—

	Cubic metres.
For the manufacture of staves (<i>merrains</i>)	500,000
For the navy and mercantile marine	200,000
For the rolling stock of the railroads	50,000

And if we add to this the quantity used in working mines (the pits of the Département du Nord alone require more than 5,000 cubic metres of oak timber of the best quality), for artillery and engineering purposes, and for certain branches of industry and agriculture, we come to a total amount of 1,000,000 cubic metres of timber in bulk, representing 500,000 metres square.

In presence of such demands, how can we avoid being pre-occupied by the diminution of the forest resources of our country? Can we trust blindly, for satisfying them, to the riches of foreign countries, which are wasting away under the influence of the same causes as ours?

England, it is said, has very few forests, and only a few thousand "hectares" of national forest. England is, it is

true, one of the countries of the world least provided with forest; but it has also long been remarked that it is one of those which contained the greatest quantity of fine trees, scattered about in hedge-rows, parks, and along roads, and which are preserved, thanks to the habits and tastes of the Anglo-Saxon race and to the stability of property; whilst with us it has been said that a tree a century old is a rare curiosity. England renews its wood in numberless plantations, of small extent, scattered all over the country.

It is forgotten, moreover, that England reckons on the power of her navy to secure for her, at all times, and under all circumstances, the access to foreign markets, and that she can supply herself with what is wanting in the soil of the mother country from her vast colonies. Canada contains immense forests; and India, on the other side, furnishes considerable resources in the way of timber.

England is far from taking no interest in this question, as it has been supposed, and trusting entirely to private enterprise, and the economic laws of demand and supply. The English Government has taken possession, in India, of all the unappropriated forests, and, in 1856, placed their management under a special department, which is entrusted with their preservation, improvement, and working. It has decided on sending young men to France and Germany, there to study the profession of forestry in the special schools, and become acquainted with the different systems of forest management, in order to apply in India the knowledge they have acquired. The Inspector-General of Forests under the Government of India, Dr. BRANDIS, has travelled through the principal forest countries of Europe, studying on the spot the laws, the systems of working, the conditions of sale; and while introducing into India all the improvements suited to the service, he prepared a forest

code, which was promulgated in 1865. The Administration of the Indian Forests publishes annual reports, which show the importance of the service and the importance attached to it by Government. "The fatal consequences of the destruction of forests," says Dr. CLEGHORN, late Conservator of the Forests in the Presidency of Madras, "are already being felt, and require immediate measures to be taken for the preservation, in the interest of all, of this public property." The example of England is therefore ill chosen.

Let us not hesitate to own that the production of a primary material—indispensable to us, whether looked at from a military, a commercial, or an industrial point of view, indispensable to both our navies, indispensable for the carriage of a commodity which ranks first amongst our exports, indispensable for the working of our richest coal pits,—concerns in the highest degree the public interest.

Let the three great interests we have named be hindered in their developments, and will not the activity of our country be damaged, and the national labour threatened? As we ask ourselves this question, we understand the force of the comparison made by our colleague, M. DUCUNG, between roads and trees. "Roads," he says, "have cost a great deal and produce nothing by themselves, but they connect everything together. So it is with trees."

This is strictly true: trees bring everything into connection, and therefore the forests which produce them fulfil, in a great country, an office of public utility and of general interest, entrusted to the State as alone capable of preserving them; and this office is fulfilled just as much by the lowland forests as the highland ones, and they ought to be preserved with the same care. Thus an eminent economist, M. LE PLAY, thinks that the State ought to possess not only the mountain forests but the lowland ones, which can alone produce large and well-shaped timber.

And now let us consider the agricultural interest, which lays claim to those lands which are now underwood, and which we maintain ought to be kept so, for the production of timber.

The national wealth would doubtless profit if every acre of land were made to produce the highest yield in material and money which it is capable of producing. But let us see how these claims of the agricultural interest would affect the maintenance of the national forests now in the hands of the State. Owing to the extensive sales which have been effected successively during the last 50 years, the area of the lowland forests has been exceedingly reduced, and if we deduct from the 900,000 hectares of public forests which still remain at the disposal of the State, all those lands, the clearing of which, if they were private property, would be prohibited by the Forest Code;* and if we exclude those admirable masses of wood which form that splendid belt of forest round the city of Paris, and which could not be touched without raising a popular outcry, there would remain, we say, but a comparatively small extent which might be cleared with profit; and the clearance of this insignificant area could not possibly have any appreciable effect upon the growth of the national wealth.

Besides, is it land which is wanted for our agriculture? There are in France nearly 7,000,000 hectares† of waste lands, whose reclamation would certainly be more useful and more pressing than that of some thousand hectares of forest. What is wanting to us is capital and hands.

Our aim, here, is merely to prove the social importance of the preservation of the forests. But if we had to treat,

* Art. 220 of the Forestal Code—Loi du 18 Juin, 1859.

† The estimate of waste lands varies considerably. M. BEQUIREL makes it 21,000,000, but he must include fallows; we only take Landes' pastures (*pacages*) and heaths.

under its different aspects the question, so keenly debated in other times, of the alienation of forests, we could show the fallacy of the argument based on the small yield attributed to them, and point out that nearly all the sales made have been a loss to the State, and profitable only to the speculators, who hastened to re-sell. The prices at sales effected during the Restoration, under the July Government, and in 1865, show that these sales gave rise to investments at 4 or even 6 per cent.: they must then have brought in to the State more than 2 or $2\frac{1}{2}$, as was constantly maintained by the partisans of those deplorable expedients. And to speak only of one of the most recent sales—in March 1865, the forests of Rozeux and Ivry, containing in all 2,485 hectares, and yielding, since 1862, an average income of 150,000 francs net, were knocked down at 2,600,000 francs, so that the revenue derived from them by Government, while under forest, amounted to nearly 6 per cent.

We will not dispute, however, that a careful survey of our national forests might indicate that in such and such places, certain woods could be profitably sold, and the soil given up to cultivation. This inquiry is the business of an intelligent administration: We speak only of the general subject, and what we contest is the assertion, *à priori*, that lowland forests do not concern the general interest, and uselessly occupy a productive soil.

And, on this last point, people are under a great illusion. Seeing, in the midst of a plain, trees whose healthy and lofty stems are crowned with masses of rich foliage, they readily conclude that they stand in a very fertile soil, and that soil is pronounced upon whilst the imagination is still under the charm of this rich vegetation. But such judgments are often very far from the truth.

A very fine forest may be found on a very indifferent soil, even on bad soil if it has depth, and even oak does no

require good land to attain the size which makes its timber so valuable; but only a soil in which it may throw out freely, to a great depth, roots in proportion to the size of its branches.

With few exceptions, the great woods possessed by the State are not on a fertile soil, and what has saved them up to this time is their standing on an ungrateful soil not fit to be brought under the plough.

Among the most important forests we may instance that of Orleans. This great wood of 32,000 hectares, stands on a sandy and clayey soil analogous to that of the Sologne, unprofitable for arable cultivation, but perfectly suited to the growth of oak. We may say the same of the 20,000 hectares of the Forest of Chaux, whose soil, very favourable to oak, refuses to grow corn, and of the silicious and calcareous lands which bear the Forests of Fontainebleau, of Rambouillet, of Compiègne, and of Clairvaux.

To clear away these forests, always excepting certain districts favoured by accidental circumstances, would only be to pave the way for disappointments such as have followed many clearings already carried out, and to run the risk, for example, of creating another Sologne on the right bank of the Loire, whilst that on the left bank is slowly, and at great expense, recovering its woods and its productiveness.

Between 1814 and 1872, 358,000 hectares of national woods have been sold; those best suited for cultivation were probably chosen, and yet, in a great many cases, the real buyers who succeeded the speculators have been cruelly deceived.

We do not admit the far too low valuation which would make out that seven-eighths of this alienated land is now uncultivated, but we must own that in many cases it has been found out too late that the supposed fertility of the soil consisted merely in the vegetable mould formed by

ages of forest growth. This rich superficial stratum is exhausted in a few years, when cultivation becomes arduous, and the yield diminishes. Many owners have replanted; others have turned the land into pasture, and where there were at one time rich forests, nothing is now seen but vast extents of blank heath.

There is another service of public interest which some forests, lowland as well as highland, may be called on to render to our country:—they may assist in the defence of our territory, at this moment particularly, when, after our misfortunes, we find ourselves with an open frontier on the side of Germany. We cannot set aside this consideration, and give up to destruction those natural barriers which Nature has provided for us, especially in the departments now most exposed.

It is useless, no doubt, to dwell upon this consideration. But we may mention one instance,—the more striking because it refers to a lowland forest, of which the half, about 1,600 hectares, most favourably circumstanced for sale, was included in the schedule of woods proposed to be alienated in 1865,—viz., the Forest of St. Amand, in the Département du Nord. These 1,600 hectares, which do not return more than 150 francs per hectare, might have been sold (by proceeding slowly, and dividing into a great number of lots) at the rate of 10,000 francs, so that the whole would have realized upwards of 16,000,000. No other of our national forests would probably lend itself to such an operation under equally favourable terms. But the military authorities opposed the sale, arguing that this wood, included in the zone of defence, was indispensable to secure the protection of our frontier.

Since then, the Prussians have taught us the use that can be made of woods. It is probable that most of the woods of Lorraine and Champagne will be included in the

new zone of defence, and that we must not touch them any more than the Forest of St. Amand. Now the finest woods are there, and excepting the forests in the basin of the Seine, which are protected by the neighbourhood of Paris, most of the remainder are scattered in mountainous districts or on barren plateaux, and would only furnish isolated spots suitable for clearing, and which would produce but a few millions.

For these important reasons forest property must be regarded as exempt from the operation of those principles of political economy, which are true in themselves, but not applicable to it. "Forests," says one writer, "cannot be likened to any other form of property." Their value should be determined by their general usefulness, rather than by the revenue they produce to the proprietor; and one cannot be surprised that M. DUCUNG, when discussing the project of sale in 1865, should have gone so far as to lay it down as a principle that "if the State did not possess forests, it would become necessary to contract a loan for the acquisition or creation of State forests."

II.

Let us, then, preserve those which remain to us, and, for that purpose, let us place the management of them in circumstances such as to enable it to fulfil, in its full extent, the mission imposed upon it by the general interests of the country.

Is the management of the forests so circumstanced?

If we look at the officers and agents employed by the Forest Administration; the way vacancies in the *personnel* are filled up, and the preparatory studies required from candidates for the forest services, the answer can only be in the affirmative.

We will not say that there might not be some reforms to be made in the machinery of the service, some improvements still to be carried out. It is not our business to examine this here. But it is only just to acknowledge that the officers of the forest service fully understand what is wanted, are most anxious to take the right measures, and have the needful knowledge and ability for carrying it out.

Unfortunately, this branch of the Administration is so situated that it receives, from above, an impulse which is not, and indeed cannot always be, in conformity with the spirit of rational forest management.

Called upon by the nature of things, by the interests of the State, by the special training of its members, to be a cultural management, it becomes, by its annexation to the Ministry of Finance, a purely fiscal one. Its aim ought to be to manage the forests, not with the view of producing the greatest money revenue, but with that of satisfying the great interests for which forests are required, and to take from them, at the present, only that which they can supply without detriment to future requirements. By a financial management, on the contrary, they are necessarily obliged to seek the highest present money return, whilst the value in capital diminishes, as was observed at the Agricultural Inquiry of 1867, by the President of the Société Forestière.

To attain its true object, it should improve its demesne, keep it up by sowing and planting, open it out by roads of communication, increasing its growing stock, and rearing high timber forests in readiness for the day when foreign countries will no longer provide us sufficiently with timber, or only at ruinous prices.

These results can only be obtained by treating the increase of the money yield as a matter of secondary consideration, and secondly, by devoting considerable sums to works of improvement.

A Financial Administration has other views; it has, perhaps, other duties. It ought to pay in much to the Treasury, to ask little from it, and consequently improve and cultivate as little as possible.

In a word, under a purely financial rule, the interests of the Budget must necessarily outweigh those of the woods. The national forests furnish an item in the receipts, and its figure is often settled by the necessities of the day. Thus, in the Budget of 1872, the receipts from forests, which have hitherto averaged 40 millions, is carried up to 60, and that when our woodlands have just been diminished after the misfortunes of war, by the loss of more than a million hectares of our finest forests.

Can it be otherwise? Is it not the first duty of the Minister of Finance to secure the receipt of the taxes and revenues of all kinds, to fill the Treasury chest as full as possible, to increase all resources; and, as ROUGIER DE LA BERGERIE so energetically expressed it, "to squeeze all the sponges within his reach?" Must it not, then, be his natural inclination to manage forests with the object of getting the highest return in money, without taking into sufficient account interests of a higher order?

As if to confirm this inevitable, this fatal tendency, and to neutralize the efforts of what we may call the forestal spirit, encouraged in the Corps of Forest Officers by special studies, and by the sympathetic, sometimes passionate sentiment, that a man placed in perpetual contact with the great creations of Nature feels for them, the Ministry of Finance subjects it to an exclusively financial control, that of the "Inspection des Finances," doubtless a most useful control in some respects, but incomplete as we shall see further on; then, by a custom rarely infringed, it selects the Chief of the Forest Administration, not from the ranks of the forest service, but, usually, from the financial inspectors,

so that this chief, often incompetent from a forestal point of view, has for sole means of information a body of men no less incompetent, quite ignorant, if not hostile to forest interests, and subject before everything, by the duties of their position, to fiscal considerations.

Such a system guarantees, assuredly, a good financial administration, but not one with sufficient foresight for the preservation of our forests. The results are but too often the selection, for sale, of portions of forest of great value, with a comparatively low annual yield, without considering their degree of utility (as we have seen in the instance of the Forest of St. Amand, which, besides its military importance, renders immense services to the coal pits of the Département du Nord); the rejection or delay of works of improvement which would require an immediate expenditure and only promise a distant profit; the felling in view of a quick return, and, indirectly, the encouraging the agents of the forest service to increase the amount of their annual fellings.

This was pointed out, at the Inquiry of 1867, by the President of the Société Forestière, M. CHEVAUDIN DE VALDRÔME, whose words we may be allowed to quote:—

“The Ministry of Finance is an exclusively fiscal office; it does not concern itself with production, and, from its very nature, it is driven to obtain from forests the utmost revenue possible, so that the cultural and preservative tendency which should prevail there has not the influence it ought to have.

“If we carefully survey the forests of the State, we find that at certain points their growing stock is seriously diminishing. . . First, because on pretext of merely carrying out the provisions of the plan for the working and improvement of the forest, clearings are made in high timber forests which ought to be preserved for the

requirements of future generations; secondly, because it may happen that the agents of the Forest Administration are influenced by the idea that they will be more favourably looked upon, if they produce a larger revenue from the forests under their charge; and this, again, can easily at any time be effected by sacrificing an undue proportion of the standard trees in coppice woods. I do not say that any pressure is put on them, but it is not the less true that they are in a false position.

“The result of this is, that the forests of the State are gradually getting poorer in high timber, forest, and old standard trees,—not everywhere, but in various spots,—which is already more than ought to be. As soon as the management of the forests shall have been united to the Ministry of Agriculture, the improvement and well-regulated working of the forest will be considered as the first and principal aim: the future will be thought of instead of the wants of the present, and the effect of this will be a large increase of our forest resources.”*

And long before the Inquiry of 1867, this false impulse given to the management of forests was unceasingly pointed out, not by grumblers inclined to criticize every existing arrangement, not by Utopians on the look out for reforms, but by practical men, by administrators, by foresters doubly competent by science and by experience.

We have quoted the opinion of a Minister of Marine, and a Report addressed to the Convention.

FRANÇOIS DE NEUFCHATEAU, Minister of the Interior, considered the annexation of the forests to the Ministry of Finance as a whim (*bizarrierie*), the felling of timber being, according to him, a branch of rural economy.

According to ROUGIER DE LA BERGERIE, Préfet under the first Empire, “did a Minister of Finance unite all the

* Agricultural Inquiry, 3rd June, 1867.

qualities and all the talents of TURGOT and MALESHERBES, he ought not to have the administration of rivers and forests assigned to him.”*

The marine engineer BONNARD, who has studied forests in their connection with the requirements of the navy, points out the risk of entangling “in the general movement of an office, on which rests the immense task of providing for all the money wants of a great State, that branch of the public service whose paramount duty it is to protect and guard zealously the growing stock of timber in our forests, which, if sold and converted into money, might often materially assist us to pay for our misfortunes or our mistakes.” “The Financial Administration does not,” he says, “offer any security for the consistent execution of a well-considered plan for any length of time, for a single finance minister may, if swayed by contrary personal views, or by the pressure of political parties, upset the plans of a century, and nullify the effects of former foresight and capacity.”

A most just observation! for what administration can require more continuity in its works than that which has to prepare and carry out plans of operations, the final results of which can only show after a period of 150 to 200 years?

The same writer adds, a little further on, “I have myself, twenty times over, been implored by the most respectable of the departmental officials, to unite the efforts of the marine to theirs, in order to save from sale the most precious forest blocks.”

High officials of the Forest Department have at different times spoken in the same sense as the authors we have quoted.

A former conservator of forests, M. DE BUFFÉVANT,

* *Des Forêts de la France*, 1817.

wrote thus in 1849 :—" The object of the Administration of Forests is not only to preserve intact the forestal patrimony of the nation, and of the 'communes,' but to make this patrimony produce the most wood possible in the present, and to prepare it for a maximum production hereafter. This management, which ought to take into account a thousand varying circumstances of soil, climate, kinds of trees, local customs and requirements, and whose object may require, consequently, so many relative estimates and speculative combinations,—this management is fitted into an office whose object is, on the contrary, of the most definite kind, the most inclined to be guided only by uniform, precise, and absolute rules." . . .

"It is of it, especially, that one may say that central administration ends by paralyzing the action of its agents, and that it is incapable of substituting any other."*

A member of the Société Forestière, M. ALOYS WISSR, has gone so far as to say that the consequence of the annexation of the Forest Administration to the Ministry of Finance has been "the abandonment of forestal interest in the woods belonging to individuals—an action either null or contrary to that interest for those of the 'communes,' and for those of the State; a management which leaves a great deal to be desired."

A Forest Administration, in fact, is not only entrusted with the management of the forests of the State; it has also, as we must not forget, rights and duties in connection with communal and private woods which have nothing whatever in common with a Fiscal Administration.

Private forest property is subject to certain restrictions, and to the observance of certain rules, which place it under the inspection of the Forest Administration. It is strictly just that, in return, it should receive a certain protection. Now

* *De l'Organisation de l'Administration des Forêts*, 1849.

the Société Forestière, the “comices agricoles,” the “conseils généraux,” repeated a thousand times their lamentations over the injury done to wooded property, the unfavourable position in which it is placed with respect to duties of “octroi,” rates (*tarifs*) of transport, and to the land tax, and dwelt on the necessity of revising some provisions of the Forest Code which relate to the supervision of private forest property.

We do not assert that all these complaints, which are of very old date, and which are recapitulated in the important evidence of the Société Forestière at the Agricultural Inquiry, are well founded—on this matter we are not called on to pronounce an opinion; but from the single fact that they relate to a special kind of property which is subject to a certain action of the State, and which is also important to the public interest, they ought to be most carefully studied by the administration charged with its supervision, and find it willing to give assistance. Property which cannot, in certain cases, change its form without the permission of the State, may fairly claim a more decided protection than that accorded to landed property in general.

According to M. ALOYS WISST, these complaints have, hitherto, had no effect on the Administration of Forests; they found no one even to receive or inquire into them, the Minister of Finance pronouncing himself incompetent whenever complaints of that sort reach him.

It is to be observed, also, that in a country where Government has always been forward to give to every branch of national labour advice, encouragement, and direction, that form of cultivation which assuredly needs it the most, should have received none at all. It can, in fact, only expect to receive such from a Cultural Administration.

M. ALOYS WISST adds that, with a view to the public

interest, the inspection exercised by the Forest Administration over the woods of individuals was often insufficient, and that the requisite prudence was not always exercised in the examination of requests for permission to clear.

The "communes" and the public establishments, whose woods are subject to the Forest Administration by virtue of Articles 1 and 90 of the "Code Forestière," are also loud in their general complaints. They endeavour to withdraw their woods from the care (*tutelle*) of the State, "and it is not quite without reason," says M. ALOYS WISSR. The Administration aggravates the restraint of this guardianship, by adding to the strict provisions of the law peremptory and minute formalities, excellent in matters of account, and which are for that reason appropriate in fiscal offices, and even their duty, but odious in the case of pressing demands, founded on most urgent needs.

But, whilst insisting on these formalities with a useless strictness, the Administration of Forests has shown the greatest readiness to entertain improvident proposals, contrary to the real interests of the "communes" as well as of the public; as, for example, when it allowed the reserved blocks, which ought to be preserved as high forest (see Article 93 of the "Code Forestière"), to be converted into coppice.

As for the woods belonging to the State, the author justifies his opinion by saying that the funds placed at the disposal of the Forest Administration were insufficient to give a proper impulse to such works as marking the boundaries, effecting the commutation of forest rights, opening out roads for removal, as required for the working, so that the charges absorbed, in some localities, three-fourths of the price of the produce, making the average production, by the "hectare," of our finest forest, very

inferior to that of forests situated in similar conditions as to fertility;—as, for example, those of the Grand Duchy of Baden.

The Paper we have thus analysed was written, it is true, as long ago as 1857, and it is but fair to acknowledge that, since that time, some of the improvements demanded have been carried into effect.

The “direction” of the forests, which, taking little account of the enormous charges of administration borne by the “communes,” had never before seriously studied the producing powers of their forests, has, for the last 10 years, regulated the system of felling and thinning in a great many of them.

The practice of selecting and marking the trees required for the navy, which had unfortunately been suspended by a royal “ordonnance,” of the 14th December, 1838, was re-established by a decree of the 16th October, 1868, and some provisions of the Forest Code were revised in the Law of the 18th June, 1859.

But these improvements have not materially altered the situation resulting from the natural tendencies of the Ministry of Finance.

For in 1866, M. PAUL TUROT, former head of one of the sections in the Direction Générale des Forêts, called attention to the same grievances as M. WISST, pointed out the same deterioration of forest property, attributed it to the same causes, and affirmed that the annexation of the Administration of Forests to the Ministry of Finance is “bad as regards the forests of the State, as well as those of the ‘communes’ and of private individuals;” that with regard to the first, it “compromises their very existence, by exposing them constantly to the danger of sales, and prevents their being of the use we are entitled to expect.”*

* *Les Forêts, les Finances, et l'Agriculture*, 1866.

Not only do the efforts made to increase the productiveness of the forests meet with no encouragement, but they are restricted within very narrow limits.

The operation now considered by all foresters as the most important, the most useful, the most productive for the future, is the conversion of coppice into high forest, wherever the soil admits of it, and it is evident that this will only be done by owners who never die,—the State and the “communes.”

But the process which aims at converting coppice into high forest, and, consequently, to an ultimate increase of profits, must at first result in a temporary diminution of production in the forest so managed.

The Forest Administration has comprehended the full importance of this operation, and how interested the State is in its being carried out; for, although society may generally depend on private proprietors for the supply of firewood, it can only depend on itself to rear timber for the generations to come, and the aim of forestal management ought, especially, to be the increased production of large and useful timber.

Well, does it meet at the Ministry of Finance with views corresponding to its own, and a readiness to cheerfully put up with a temporary reduction of income?

This question is answered by an official, high up in the Forest Administration, the “Vérificateur des Aménagements,” M. TASSY, formerly Professor at the Agricultural Institute of Versailles, and his answer is of recent date. We find it in the preface of the second volume of his important work, *Sur l'Aménagement des Forêts*, published in 1872.

“It is not sufficient,” he says, “to undertake this great operation; we must resign ourselves boldly to temporary losses if it is to be effectually carried out. I fear that on this point the higher Administration is not inclined to show

the necessary disinterestedness. This is a serious danger. If, of all the works demanded by a systematic management of the forests, turning coppice into high forest is the most advantageous for the future when properly carried out, it may become, on the contrary, one of the most disastrous in its results, when it has been grudged the necessary sacrifices on which its success depends; the Administration, whilst acknowledging the utility of these works, hesitates to sanction them as soon as they imply a diminution of income."

It is thus acknowledged by one of the heads of the Central Administration that "this bias against a temporary reduction of revenue hinders forestal agents from carrying out the desirable improvements in the State forests.*

Though less forcibly expressed, this opinion is much the same as that of M. PAUL TUROT, who affirms "that the annexation of the forests to the Ministry of Finance constitutes a danger for the national demesnes which we should endeavour to escape from as soon as possible."†

The "Société des Agriculteurs de France" called attention, two years ago to the same danger, in terms no less energetic, and if they are suspected of exaggeration, let us recall the sale of 17,000 hectares of "dunes," planted at great expense, which inaugurated a few years ago the transfer of the "Service des Dunes" from the Ministry of Public Works to that of Finance.

It is well known that since BREMONTIER—thus rendering an immense service to our coast districts—taught the method of consolidating the "dunes" by sowing them with maritime pines, 78,000 hectares have been covered with wood. These forests give a considerable revenue in the shape of resin. This substance having tripled in value during the

* *Études sur l'Aménagement des Forêts*. Second edition, 1872.

† *La Question des Forêts devant l'Assemblée Nationale*, 1872.

American war, the Ministry of Finance forgetting that the object of planting the "dunes" had not been to create a resource for the Budget, but to protect the coast, considered these woods placed under its control by the decree of the 19th April, 1862, as merely "another sponge to squeeze;" and obtained from the Corps Legislatif the power to sell 1,700 hectares of them, which brought in 11,300,000 francs. They had, however, cost in raising, at 275 francs the hectare, 4,675,000 francs.

If it be considered that a part of these 17,000 hectares was in full bearing, and that their planting must date from near the beginning of the operation,—that we may therefore admit for the whole an average of 30 or 35 years' growth,—it will be seen that the prices realized at the sale barely represent the capital invested. But this alone would not fairly represent the result of the operation; for we ought to set aside certain lots sold as building ground at a very high rate. The parts, covered with pine trees ready to be tapped for resin, were sold at from 800 to 1,000 francs the hectare, and younger woods at the ridiculous price of 50 francs the hectare, having cost 275 francs to create. Let us add that sowings of from 1 to 5 years old were put up for sale, but, happily, found no purchasers.

And, now, what has been the result of this?

That the purchasers have tapped the pines to excess, and that in all probability, a few years hence, the greater part of these forests will have been destroyed, and the expensive operation must be begun anew.* This is what an Administration, guided by purely fiscal motives, brings us to.

We will, then, conclude this part of our task by maintaining with the competent author of *Études sur l'Aménagement des Forêts*,—M. TASSY, "The opposition of

* J. CLAVÉ, *Revue des Deux Mondes*, Mars 1866.

views and tendencies so often pointed out, and notably in the matter of sale of forests between the Forest Administration and the Ministry on which it is dependent, a diversity of views and tendencies most easy to understand. The mission entrusted to the Ministry of Finance, which aims, above all things, at maintaining between the expenses and the receipts of the State, an equilibrium, without which the public service would infallibly be compromised, is, certainly, most deserving of respect; unfortunately it is in opposition to works whose useful results cannot be produced immediately, and it imparts to the mind an anxious hesitation and habits of parsimony, which are totally opposed to the boldness and liberality required to entertain, and satisfactorily to deal with, questions tending to the indefinite development of the moral and material riches of the nation.

“Men who, like foresters, are accustomed to prepare fruits which they will not gather; men who enjoy planting for posterity, are naturally inclined to burden the present for the sake of the future. That this tendency should be kept in check, I understand, but it ought not to be suppressed entirely; for, after all, it constitutes the honour of individuals and the duty of nations. The Minister of Finance would, however, if it depended on him alone, suppress it completely; and to sum the matter up in few words, I will say, that when the Minister of Finance thinks about future generations, it is to deprive them of their money; whilst forest management, on the contrary, seeks methods of giving it to them.”

Such are the two aspects, the two tendencies, clearly pointed out by a man of the profession,—by a man whose words are the result of his practical experience, and he adds: “How should the Ministry of Finance and Forest Administration ever be able to agree? They never will

agree, and it would be rendering a great service to both, to order their separation. All competent men insist on the usefulness, the urgent necessity of this measure."

After this quotation, it is not surprising if, even in the higher regions of the Ministry of Finance, this question should have been sometimes raised.

In 1854, the Director-General of Forests, M. BLONDEL, though not himself a forester, but an Inspector-General of Finances, thought it his duty to point out to the Emperor the anomaly of the present system. But this step was followed by no results, and the arrangement, so favourable to financial expedients, was persevered in.

Few questions have, however, been more studied than this one, and it is difficult to contest the weight of the arguments on which are based the expressed desire of all the Agricultural Societies and the "Conseils généraux" in the "Départements."

What are the arguments which hitherto have been allowed to turn the scale in the opposite direction?

III.

The partisans of the annexation of forest management to the Ministry of Finance justify it by two reasons:—

The necessity of centralizing under this Ministry all the revenues of the State:

The necessity of not weakening the control over so important an item of receipt as the produce of the forests.

We do not think any other argument has been brought forward.

M. LARABIT, in a report by which he caused the rejection in 1865 of a petition, addressed to the Senate, in favour of the union of Forest Administration with the Ministry of Agriculture and Commerce, merely stated that "the Ministry

of Finance ought to centralize in their Administration all the receipts of the State, and, consequently, all the revenue from landed State property.

It is this last conclusion that we demur to.

The utility of centralizing the collection of all the revenues of the State in the Ministry of Finance is undoubted. But is it necessary for that purpose to centralize under the Ministry of Finance all those Administrations which, having for their chief aim duties of a different and of a higher order, yet contribute to the receipts, and to consider them for this reason only as branches of the financial service? Is this in the natural order of things?

The Ministry of Finance is a collector of taxes, a receiver of other branches of public revenue; but it is not a producer of money. It collects all the revenue of the State, in order to be prepared to meet its liabilities; but it does not concern itself with finding out if this or that social want is satisfied, and is, therefore, unfit to direct those services which have to provide for the manifold requirements of the country.

The collection of the 35 or 40 millions produced by the forests is one thing, but the management of these forests is quite another thing; because, as we believe we have already proved, the question of receipts is here secondary, and quite subordinate to questions of an entirely different order.

If the single fact of contributing to the receipts were to decide the classification of the various services in the Governmental organization, where would the action of the Ministry of Finance end?

Most of our public services produce some revenue. Some stand in the budget of receipts for considerable sums, and their aggregate surpasses the yield of the forests.

The Ministry of the Interior pays into the Treasury more than 20,000,000, arising partly from the Administration

of Telegraphs; partly from that of Prisons. The receipts of the Ministry of Public Instruction and of Agriculture amount to near 5,000,000 each; those of the National Printing Office surpass this sum. The Ministry of Public Works, those of War and Marine, all receive considerable sums, even up to the Ministry of Foreign Affairs, which has its receipts from consular offices.

These various receipts, of which the greater part are directly levied by the agents of the offices which pay them in, a thing which never occurs in the forestal management (we shall speak further of it when we come to the question of control), are none the less centralized in the Ministry of Finance, though coming from Administrations which are not dependent on it.

A very competent writer on forestal subjects has turned the question into a joke by observing that "no one had ever proposed putting the fortresses into the hands of the Minister of Finance, under the pretext that the grass annually cut upon the ramparts brings in a revenue which enters the Treasury chest." But however strange and exaggerated this expression may appear, there remains the real truth that forests should be emancipated from the Ministry of Finance, on account of the indispensable part they act in social economy,—a part not inferior, though belonging to a different category of ideas, to that of the fortresses, with, however, this difference, that the necessity for the one depends on the passions of men, and the necessity of forests is one of Nature's own making.

Let us observe, besides, how small a place in the present budget of France is occupied by the produce of the forests. The State forests give annually an average of 35 to 40 millions. On a Budget of 2 milliards (400,000,000) this is hardly $1\frac{1}{2}$ per cent. This would suffice, one would think,

in the face of the serious and numerous embarrassments of the present system, to deprive the argument we are refuting of any weight.

But we have another and very serious consideration to oppose to it. The management of the forests of the State is only a part of the duties attached to the Forest Administration, and it is the only one which the Ministry of Finance can claim under pretext of centralizing the revenues of the State. By all its other functions it would escape completely.

The woodland property of France consists of about 9,000,000 hectares, of which 6,000,000 belong to individuals, about 2,000,000 to the "communes," and less than 1,000,000 to the State. The Forest Administration has under its control the woods belonging to the communes and to public establishments, as well as those of the State. The State itself, then, possesses only one-third of the property managed by this Administration. Yet more, it keeps up a certain supervision over another demesne twice the size of the one it entirely manages,—over private forest property. Is it because it is a Fiscal Administration that the management of the woods of the "communes" and the inspection of private woods has been given to it? Surely not; and by changing it into a Fiscal Administration, it has happened, as we have seen that, carried away from its true mission with regard to the woods of the State, it has not always done its duty to the woods of the "communes" and of private proprietors.

It is not easy to take different views, not according to the nature of the woods, but to the nature of their owners. To carry on by turns, here a fiscal there a cultural management, would be a real *tour de force*. And it must needs be that communal property will suffer from the impulse given

to the Forest Management as regards the forests of the State.

But this is not all. The Forest Management has yet other duties.

The Law of the 28th July, 1860, and that of the 8th June, 1864, met a great public interest by their provisions with regard to the replanting and turfing of mountainous districts. They have made these operations compulsory on the proprietor in certain cases. The execution of these works has been entrusted to the Forest Administration.

We ask again,—is it a fiscal management that the law-giver could have meant, could have wished, to entrust with this care? Is it not the special work of a Cultural Administration? Does it mean anything but expenditure, and how many years will it take before these works bring in any receipts that the Ministry of Finance will be able to centralize?

Finally, the service for replanting the “dunes,” which was created by the decrees of 12 Messidor, A. IX., and the 14th December, 1810, and which a decree of the 5th February, 1817, had placed under the control of the Director-General of “Ponts et Chaussées,” was transferred, as we have seen, to the “Direction-Générale des Forêts,” by a decree of 29th August, 1862. And here again we ask, whether the Minister of Finance is really competent to watch over the important work of fixing, keeping up, and preserving the “dunes” which protect our shores? No one, surely, can assert it, and we have seen the speedy results of that measure.

In a great part of its functions, in the greatest number of them, the Forest Administration has nothing in common with the Ministry of Finance. In one only it contributes to the budget of receipts. But the centralization of receipts

in the Ministry of Finance has nothing to say to the question, that centralization being quite independent of the organization of the other branches of the Forest Administration.

Let us inquire whether the argument, based on the necessity of an effectual control, has any more weight.

IV.

The operations of an Administration such as that of the forests demands two sorts of control ; the financial control, which verifies the accounts, ascertains that the receipts come in regularly, and makes sure that the sum total of the produce is paid into the coffers of the State ; and the professional control, the control of the property, of the growing stock, its working and improvement—in fact, the same control which a private proprietor, mindful of his interests, or a wise and intelligent head of a family watching over the improvement of his estates, would exercise.

Under the present state of things, the first of these two controls exists—the second is entirely wanting. The measure we propose would allow of its being created, or, rather, re-established, without in any way weakening the first, for in requesting that the Forest Administration should be independent of the Ministry of Finance, it is only in so far as concerns the cultivation and the working, and not in those matters which belong to the collection and paying in, of the revenue. On this point we ask for no change.

We must here enter into some details respecting the working of the Administration of Forests, in order to explain that the proposed change will in no degree weaken the control exercised by the “*Inspection des Finances*.”

In the forestal service there is a complete separation between the management and the realization of revenue :

the forest agents are agents of management, never agents for the collection of revenue. The Administration of Forests is nothing but a steward, and has, beside it, other agents charged with the task of collecting payments, and with which it has nothing to do. These agents are, for the State, the Treasury accountants ; and, for the "communes" and public establishments, the municipal collector-receivers. The forest agents are in no degree accountable, and all handling of public moneys is strictly forbidden to them.

Their business, with regard to the working of the forests, consists in arranging for the annual cuttings, sanctioned by the working plan, for each forest, estimating the value of the timber to be felled, and in preparing the public notices of sales. But they have nothing to do with the sales themselves, which are effected by the Préfet or his deputy.

The sales completed, the price is delivered in drafts accepted by the Treasury Paymaster-General, and payable to his office. The forest agents have only to give the permits to cut, on sight of the certificate delivered by the accountant who has received the drafts, and to secure that the felling and the removal are carried out according to the prescribed conditions.

It is exactly the same with those receipts which arise from minor accidental woodfalls, cuttings of underwood, "recepages," rents of pastures, lettings of shooting, &c., with this only difference, that money receipts of this kind are paid in to the receiver of "enregistrement;" but, as in the case of the receipts for timber, without any interference on the part of the forest agents.

Will the transfer of the management of forests alter in any way this excellent system? Not in the least. The Treasury accountants will receive the amounts, just as they do now, under the control of the Inspection of Finance,

which will continue without any difficulty and quite as effectually to exert its superintendence over this part of the public revenue.

But will the outlay necessary for the maintenance and improvement of the forests, the opening out of roads, the planting up of blanks, and the expenditure demanded by the special laws on replanting, turfing, and fixing the "dunes," be less under financial control than the realization of revenue? Not at all. For the expenses under these different heads the conservators of forests are, each in his district, only subordinate officers. They deliver to agents and overseers, conformably to the pay lists, and to contractors for works, on sight of official reports, cheques payable by the Treasury Paymaster-General.

But as no works can be begun, no expenses incurred, unless authorized by the Minister or the Director-General, and as no payment can be made by the accountants, unless a corresponding credit has been opened for them within the limits of the Budget, the control over the expenditure is complete. Are not the engineers of the "Ponts et Chaussées" similarly situated? And are the various branches of public works therefore placed under the direction of the Ministry of Finance? The conservators will be, like them, subject in this respect to the control of the Accountant-General of Finances, to the Audit Office, and consequently to the examination of the "Inspection des Finances."

The proposed change will not alter these arrangements in the least. The control as regards the accounts of receipt and expenditure will be just the same as it now is.

But this exclusively financial control is insufficient. The superior Administration cannot learn from it whether the rotation fixed is exactly observed for the felling of wood, whether the replanting of blanks is carried out with care

and economy, whether the newly-made roads are useful, whether, in order to increase the receipts and to earn an apparent title to approbation, the revenue may not have been increased at the expense of the growing stock.

This technical and cultural control, which would be so essential, did exist from 1808 till 1824. There was, at that time, a body of Inspectors-General of Forests which was of great service, because it was composed of professionally trained men, who saw on the spot what the Director-General can only know through reports on paper. Their suppression, in order to be replaced by the "Inspection des Finances," has loosened the connecting links between the general direction and the heads of the Forest Administration in each "département." A control of account was established, and rightly; but as to management, the conservators and inspectors are no longer, in reality, subject to any control.

It is not that this control is beyond the powers and the rights of the "Inspection des Finances." But is it competent to undertake it? Can it decide with authority, when technical questions are raised in the Administration of Forests? Did even their body contain some functionaries well skilled in agricultural science, would these be able to exert any effectual control? Everything is against their doing so; want of the practice necessary for really useful inspection, their multifold occupations, the short time they could give to each forest district, and the habitual application of their minds to details of work, without the least analogy with that connected with forests.

Can, for example, an Inspector of Finance estimate safely the importance of the fellings with regard to the productive power, or what foresters call the possibilities of a forest? Will he be able to judge if that point has been reached, or if it has been exceeded? Such would be the

result of a real control. But what an amount of study, what observations, what practical and theoretical knowledge is required to determine, with certainty, a point which varies from one wood to another according to the soil, the climate, the aspect and the nature of the trees. Would a short visit every 3 years, in districts of an average size of 7,000 hectares, be sufficient? A man not of the profession would hardly, under such circumstances, be able to make out with exactness a revision of a cutting.

Agents of the Ministry of Finance, and not of the "Direction-Générale" of Forests,—occupied, above all, with the financial aspect, and with whatever touches matters of account,—they must necessarily impress on the service an essentially fiscal character.

From this inclination, natural to the Inspection of Finance, and quite justifiable in it, from the nature of its duties, and from the nature of all the other services it has to control, there arises a tendency,—very good as regards book-keeping, but vexatious in a cultural point of view,—a tendency to confine agents within a narrow network of minute formalities, and uniform, precise, absolute rules.

"Hence arises," says M. DE BUFFÉRONT, a former conservator of forests, "that spirit of our instructions, of our orders, which never touch upon problems of sylviculture, on civil and administrative rights and laws, but on returns, formalities, and writings of all sorts, in which one never finds any solution of the real point at issue, even in most important questions, but plenty about all that is matter of pure form."

Thence, also, that increase of office work, the exaggeration of which was pointed out by M. DE LA BOUILLERIE, in his report on the Budget of 1872, and which applies to these minute rules imposed on the Administration of Forests by the spirit and the tendencies of the Ministry of Finance.

We think we may safely say that, looked at as manage-

ment, the control is imaginary. As concerns the accountability for receipts and expenses, it will not be meddled with by the fact of transfer of the Forest Administration from one ministry to another ; and the desire expressed to this effect by the committee on the Budget will be respected. The principle of the centralization of receipts at the Ministry of Finance will not be disowned either, for its agents alone will continue to collect and control them.

The two objections thus fall to the ground.

V.

After having thus proved the necessity of removing the forestal service from the Ministry of Finance, we do not think it will be necessary to prove why it should be united to the Ministry of Agriculture.

Forests, doubtless, have a connection with several ministries,—intimately with that of Public Works, and especially with the Marine, so much interested in the preservation of timber.

Thus in 1815, there was created, outside the Ministry of Finance, a special Board entrusted with the navy timber ; and a body of naval forest agents was organized by a decree of February 1818.

It is impossible, however, not to acknowledge that it is with the Ministry of Agriculture that forests have the most numerous and most important analogies ; and it is to this effect that all the writers, all the “ conseils généraux,” have concluded, when demanding the separation of the Forest Administration from the Ministry of Finance.

There is, in fact, a close connection, or rather a joint responsibility, between sylviculture and agriculture. The one is a branch of the other.

Are not such works as those which aim at turfing slopes, replanting hills, and sowing down “ dunes,” purely agricultural ?

The laws on turfing and replanting acknowledge this so decidedly, that they require all such plans to be submitted to the Minister of Agriculture for his approbation. They have thus added an administrative link to the natural one existing between agriculture and forest management.

We need not, we think, discuss the question raised by the "rapporteur" of the Budget of 1872, as to the union of the forest service to the "Direction-Générale" of demesnes. This measure would leave it still under the Ministry of Finance, the very point we object to, under whatever form. Such a measure would only aggravate a state of affairs we lament, for it would increase the influence of a fiscal spirit and destroy, in its behalf, the autonomy of the forest service. We must, however, observe that the system our honourable colleague recommends was twice tried, in 1790 and in 1817, and was finally condemned after full trial. It produced the worst effects, and provoked in all the "départements" rich in forests, reiterated complaints from the "conseils généraux." It sank at last, in 1820, under their opposition.

By the nature of things, as the Agricultural Society of France well expresses it, the management of forests belongs to the Ministry of Agriculture. It is, in fact, with this ministry that are connected the principal services required of it by the country. ✱

Consequently, the Commission for the Revision of the Administrative Organization has the honour to submit to the National Assembly the following project of law :—

PROPOSED LAW.

Single article. That six months after the passing of the present law, the general direction of forests be withdrawn from the Ministry of Finance and united to that of Agriculture and Commerce.

COPROLITES.

By CHARLES BIDWELL, MEMBER.

*Read at the Ordinary General Meeting of the INSTITUTION OF SURVEYORS,
April 27th, 1874.*

E. J. SMITH, VICE-PRESIDENT, IN THE CHAIR.

IN introducing to this Institution a Paper on coprolites, it may be thought that I have undertaken a somewhat responsible task, seeing that science has not as yet put forth a distinct or precise definition of what these so-called “coprolites” really are,—the opinions of scientific authorities being considerably at variance as to the origin and nature of these fossils.

I would, therefore, at the outset, disclaim any pretension to originality of idea or opinion with regard to the scientific side of this subject.

For the sake of convenience, I propose to divide this Paper into two principal heads,—the one touching upon the geological or scientific knowledge we possess of coprolites; the other containing the matter of fact and practical part of my subject, which bring it more especially within the province of the surveyor. As regards the first; what I have attempted to do, and I hope I may in some measure have succeeded, is to give you, in a condensed form, the views, evidences, and opinions of geologists and men of science who have studied this question, and are qualified to speak with authority on the subject. In the course of these remarks I shall have occasion to refer to Papers which have been read, and are published in the *Transactions*

of the *Geological Society*, and other journals, and if Members of this Institution should be stimulated by my Paper to pursue more deeply the geological side of this subject, they cannot do better than read those Papers *in extenso*.

As regards the second or practical part of my Paper,—namely, the value of the coprolites, the mode of working them, and other details,—I shall be able, with the aid of my father's experience, and my own knowledge of and contact with the subject, to speak with some authority.

But to proceed. In the first place, I must ask you to bear in mind that the term “coprolites” [κόπρος λίθος] in its literal sense, *i.e.*, “the fæces or dung of animals,” as applied to the substances understood by the word in the present day, is a misnomer, the more modern and correct appellation being “phosphatic nodules;” yet, at the same time, I shall continue, for the sake of convenience, throughout this Paper, to use the word “coprolite,” but always in its broadest sense.

Coprolites were discovered originally in Suffolk, about the year 1843, by Professor HENSLow, at the base of the crag formation.

The Suffolk crag is a tertiary formation of the older pliocene strata, and rests upon the London clay, and between the red crag and the clay, *i.e.*, at the base of the crag, and resting on the clay, the layer of coprolites or nodules is found at considerable depths, except where denudation has taken place, and then the veins are found nearer to the surface, but these instances are not frequent.

When these nodules were first found, they were supposed, as I have before remarked, to be fossilized dung; their curious appearance and oblong semi-rounded shape, polished by the action of water, tending to confirm this idea.

Sir CHARLES LYELL, referring to the Suffolk coprolites,*

* *Elements of Geology*, ch. XIII., page 201.

says, "Many of the fossils found in the red crag have been washed out of older tertiary strata, especially out of the London clay.

"This is particularly the case in one of the lower beds, which has of late been much used in agriculture for manure, as containing nodules of phosphate of lime. These nodules often include crabs and fishes like those of the London clay, and thus clearly betray the date of their origin. With the nodules, in which there is nearly 60 per cent. of phosphate of lime, occur rolled flint pebbles, and others of sandstone, containing casts of crag shells, and many ear bones of whales. Some teeth of the *Mastodon arvernensis*, and of a rhinoceros and tapir, have also been found in the same bed, which has been worked near Felixstow among other places."

From this it would appear that Sir CHARLES LYELL considers these Suffolk coprolites to be principally the productions of the London clay, or they may be derived in some places partly from the destruction of the older beds of coralline or white crag; and, in this, Mr. J. E. TAYLOR, F.G.S., the editor of *Hardwicke's Science Gossip*, seems to agree.

Speaking of the denudation of the coralline crag and the London clay, he says, "For ages before the depression took place, which brought the crag seas over Suffolk, this had been a land surface, over which had roamed hosts of wild and extinct animals. The wear and tear had loosened and washed out the fossils of the London clay, so that underneath the red crag, and with the latter resting on it, you find a bed of stones—the so-called coprolites."

Among the nodules are found also pieces of bone, teeth of extinct sharks belonging to species measuring from 40 feet to 50 feet in length; the ear bones of cetacea (whales), vertebræ and teeth of fishes, and other animal

remains, which point to the source from whence the phosphatic nodules were derived, namely, from the phosphate contained in those living organisms which has been gathered together by chemical affinity into masses and lumps, and which the action of water has rounded and formed into the nodules of phosphate of lime, as they are now found in their re-deposited state.

The marine formation of the Suffolk crag coprolites is shown from the fact that a considerable number of marine shells are found with the fossils, and many of like species to those which are now found in the sea of the eastern coast.

The discovery of coprolites in Suffolk, and the demand for them, when excavated, as a commercial commodity containing a per-centage of phosphate of lime, valuable in the manufacture of artificial manures, turned the field of inquiry by scientific and business men into other directions, to try and discover beds of these fossils; it was some time subsequent to the discovery of coprolites in Suffolk that they were found in the green-sand formation of Cambridge-shire and in part of the adjacent counties of Bedfordshire and Hertfordshire.

The upper green-sand is a secondary formation of the upper cretaceous strata, and contains the most valuable deposit of phosphatic nodules that has yet been discovered in England.

The coprolites are found at depths from the surface varying from 4 feet to above 20 feet, but the veins are not often excavated when the depth exceeds 20 feet, unless the seam happens to be a particularly rich one, as the quantity of superincumbent strata required to be moved, makes the cost too great in getting them; at present no means have succeeded for obtaining the coprolites by underground excavations, though several experiments have been tried, but have failed to answer in consequence of the

insufficient depth, seldom exceeding a thickness of 1 foot, of the vein of nodules.

Possibly, when all the more shallow veins are worked out, some invention may be introduced for getting the deeper ones by underground excavation or otherwise.

The phosphate occurs in pieces and nodules varying from the size of a pin's head, to large lumps of half a pound in weight. The exterior of the nodules is the peculiar dark green colour of the formation in which they are found, but when broken up the dust is of a dirty white colour. The seam lies at the base of the upper green-sand or chloritic marl, and mixed with it, but generally resting upon the surface of the gault.

There has been, in the last few years, considerable difference of opinion as to the origin of these phosphatic nodules. The first and erroneous impression was, as I previously stated, that they were coprolites in the strict meaning of the term, but that idea has long since exploded.

In investigating the recent opinions of geologists upon the origin of the Cambridge coprolites, I find that Mr. CHARLESWORTH, an eminent geologist, has denied that true coprolites are found in the formations of Cambridgeshire; and has stated, after careful investigation, that these coprolites are totally unlike the true coprolites of the Lyme Regis formation.

The Rev. OSMOND FISHER, F.G.S., who is the author of one of the latest Papers on the subject, viz.—on the *Phosphatic Nodules of the Cretaceous Rock of Cambs.*,* enters very clearly and extensively into the origin of the coprolites, or phosphatic nodules. In describing them, he says—

“The bulk of the collection consists partly of finger-shaped and partly of amorphous lumps, varying from a

* *Quarterly Journal of the Geological Society*, Feb. 1873.

very small size to pieces weighing about a quarter of a pound, though few are so large as that. The other variety, which though numerous, is less so than the former, consists of long pieces, of such a form as would be produced by taking a cake of dough, of the shape of an elongated ellipse, and folding it over a stick laid upon its longer axis."

And, again,—

"Upon a close examination of their surface, it will be perceived that they have a granulated surface, like that of leather, and that they are constantly wrinkled in places, as if by the contraction of an integument The constancy of these characters of the surface and their general shape according with the idea of growth, renders it certain, in my opinion, that these nodules were organic bodies."

He then goes on to state that in his original opinion he considered that they were sponges and zoophytes, but finally confines himself to the statement that they were organic bodies.

He sums up his theory as to the derivation of the Cambridgeshire fossil layer, as follows:—

"They seem to have been washed out of a calcareous marl, similar in character to the marl which lies above it (the layer of fossils); in short, the nodule bed is a condensation of the 'chalk marl with glauconite grains.'

"I believe this to be a much more probable account of the derivation of these nodules than that which attributes them to denudation of the gault. It is true that nodules of a somewhat similar character are found below the gault, and I have no doubt that their origin is likewise organic, but they are for the most part much smaller—dwarfed, as if the muddy waters of the gault sea did not suit them; they are also very sparsely scattered in the clay."

Another authority, who has studied the subject, and

may be quoted, is Mr. SOLLAS, of St. John's College, Cambridge.* He says, "In all cases the coprolites are the result of the fossilization of organic matter, or the immediate product of its decomposition The basis of animal matter was derived from various sources, the fossil remains of various vertebrata, crustacea, echinodermata, and mollusca, and so forth, are coprolites, the origin of which is clearly evident; of the rest, the nature of which has hitherto been unknown, the majority are fossil sponges."

In the discussion, which follows this Paper, Mr. J. F. WALKER thought that most of the fossils of the phosphatic band, at the base of the chalk marl, were derived from the gault; whilst the bed differed from chalk only, by green grains becoming gradually more abundant.

The above-quoted authorities appear to agree in attributing the origin of the coprolites to the fossilization of organic bodies, but whether those bodies were the sole production of one geological period, or whether they are partly derived fossils from other beds, seems to be still a disputed point.

I will now quote the Rev. F. G. BONNEY, M.A., F.G.S., F.S.A., of St. John's College, Cambridge, who has taken considerable interest in this subject, and has written a very excellent Paper on the *Upper Green-sand or Chloritic Marl of Cambridgeshire*.†

He attributes the formation of the nodules to "concretionary action." He says—

"The excreta, softer tissues, and smaller bones of vertebrata, the bodies of numerous invertebrata, many of which have left no other trace behind, the various marine

* *Quarterly Journal of the Geological Society*, Vol. XXVIII.

† *Proceedings of the Geologists' Association*, Vol. III., No. 1.

plants, which probably would flourish abundantly in a shallow sea, to say nothing of the *apatite*,* which might be present in the detritus wherein they were entombed, would furnish a considerable supply of phosphates, in fact, *cæteris paribus*, a shallow sea appears to be more likely to be rich in phosphates than a deep one." He goes on to say—

"I regard, then, these nodules as the result of a process which took place *during a part of the gault period, and was continued during the green-sand epoch*; and I explain their abundance, as I have already said, by considering the seam as the riddlings of a considerable deposit."

He describes the "matrix" as a fine, chalky mud, largely composed of foraminifera and minute fragments of organisms. Glauconite grains are abundant enough in the rock to give it a distinctly green tinge. The grains are also sometimes entangled or embedded in the phosphatic nodules.

The foregoing quotations and remarks will, I trust, have given you a short insight into the several modern theories of the origin of the Suffolk and Cambridgeshire coprolites. From what we can gather from these and other writers, it would seem that Cambridgeshire, in the latter part of the Neocomian or early part of the Upper Cretaceous period, was covered by an inland sea, and these phosphatic nodules are a sedimentary deposit, composed of organic bodies and other materials contained in the waters; that this deposit should have been drifted or laid in a small thin seam or band, running in an uncertain discontinuous line, is very remarkable, and, like many other geological facts, has not as yet been clearly explained.

I shall not attempt to give a description of the various fossils found in the upper green-sand deposit. Any one who is interested in palæontology will find a very complete list in Mr. BONNEY's Paper.

* Mineral phosphate of lime.

Neither time nor the limits of my Paper will allow me, even if I were so disposed, and could throw fresh light on this part of the subject, to enter more deeply into it. I do, however, strongly recommend you, especially the younger Members of this Society, to follow it for yourselves, as it is an eminently interesting study.

I will now proceed to consider the subject practically, and this, perhaps, comes more within the province of this Institution.

The vein of coprolites in Cambridgeshire extends, with breaks and intermissions, through the valley of the Cam or Granta, in some places a mile or two in width, commencing at and around Whaddon, near Royston, and thus on to Cambridge. The fossils are also found following the course of the river below Cambridge, in the Neocomian or lower cretaceous beds, as at Bottisham and at Wicken, and thus on to Soham, Stretham, and Thetford, but at this point they seem to run out. The first action which is taken by a land-owner, who has fair reason for supposing that his lands contain coprolites, is to have the stratum tested, by boring with gouge-shaped boring irons, or by having test holes dug in the shape of a grave, for the purpose of ascertaining the depth of the vein of fossils from the surface, and its thickness when touched upon, also the nature and consistency of the super-imposed top soil and substratum, and the quality of the fossils themselves. To give you some idea of the difficulty of thus ascertaining the true facts, I will just relate an instance which happened to us only the other day. We had a piece of land, containing about 10 acres, tested very accurately as we thought. I went over it myself and examined the borings, and found, at about 14 feet from the surface, the usual chalky marl, with a moderate vein of coprolites. We finally let $5\frac{1}{2}$ acres of the ground to be dug at the rate of £100 per acre,

The contractor has now dug about half an acre, containing a fair vein of stones, but he has found the layer of fossils suddenly fail, and upon careful examination we have discovered a band of land from 20 to 25 yards in width containing no stones; this band is evidently the channel or bed of an ancient river or stream which, years ago, flowed over the gault, cutting its way through the upper strata, and thus denuding a portion of the fossil bed. It is next to impossible to define accurately the position, course, and exact limits of this band, but as the piece of land cannot be properly excavated and re-levelled without turning over this dead-land, the contractor is equitably entitled to be compensated for the failure of the fossils, and for the cost of moving soil from which he derives no benefit.

The next step is to estimate the value of the vein, for excavation by coprolite contractors. It is needless for me to tell you that the price, per acre, of the coprolitic deposit varies very greatly, inasmuch as there are, necessarily, numerous and important elements to be taken into consideration in estimating the value of the fossils. There is, for instance, the depth of the vein from the surface and its thickness, continuity, and extent; for sometimes the seam is found to be what is technically known as "pocketty," *i.e.*, having faults in it,—the fossils being found only at intervals and in small quantities. Again, the quality of the fossils, chemically, having regard to the amount of super-phosphate they contain, also as to whether the sample is a clean one, *i.e.*, not intermixed with gravel and small stones; the situation of the land as regards good roads, distance from rail or water carriage; and, lastly, the marketable price of the fossils when cleaned and fit for the manure merchant, which is an ever-fluctuating component. Bearing in view these and other matters, which must and do occur under varying circumstances, it is no easy task for the surveyor

to estimate the true value of the fossils. In dealing with several large workings in which we have been concerned for land-owners, we have adopted the plan of receiving tenders for the coprolites, at so much per acre, subject to certain forms and conditions, but this is only resorted to in large undertakings. A royalty is sometimes charged, in small workings, at per ton, upon the fossils raised; but the objection to this system is that there is considerable difficulty in checking the quantity of coprolites removed from the land.

The most usual and generally recognized plan is to sell the vein of coprolites to the contractor, at a certain price per acre, and have the quantity of land which has been excavated surveyed accurately half-yearly or quarterly, as the work proceeds.

When the digging for coprolites first commenced in the district around Cambridge, 12 or 14 years ago, the value of the fossils was not thoroughly understood. At that time, a payment of £70 to £100 per acre—the landlord having to compensate his tenant for the inconvenience and for the land kept out of cultivation—was considered a full price for the right to dig, whereas the value at the present time shows an increase in some cases of as much as 100 per cent. We have let land, from which the contractor had, a few years since, excavated the fleet vein from parts of the field, for a payment of £70 per acre, to be re-dug, and the deeper fossils got at the rate of £120 per acre.

In fact, at the present time, £140 to £150, and even as high as £200 per acre, is not an unusual price to be paid for the right to excavate a vein of coprolites of good quality, and lying at a reasonable depth,—say not more than 12 or 14 feet from the surface.

The yield, per acre, fluctuates from 150 to 400 tons per acre. I consider 300 tons per acre may be taken as a fair average yield in the locality of Cambridge.

The discovery of coprolites has tended to enhance the price of land in certain districts of Cambridgeshire, and has been a benefit to all classes of the agricultural community—except, perhaps, the tenant farmer ; but even of that class several have turned coprolite contractors, and gained large profits at the business. It has also increased the wages of the agricultural labourer.

Independent of the monetary value of the fossils themselves, their excavation improves the land for future cultivation, if the work is carefully carried out, the top soil preserved, and the land properly restored and re-levelled, as it is the means of the land being thoroughly aërated, turned over, and shifted, besides the advantage which must accrue from the acquisition of capital, which can and should be devoted to the improvement and development of the soil.

Having in view the increased income to the owner of the soil, some very curious and interesting facts, which have come under my cognizance, might be alluded to if time permitted. I may mention, *e.g.*, that the Corporation of Cambridge has made, for some years, an income of something like £2,000 per annum, by raising coprolites from “ Coldhams Common,” Cambridge, which before did not produce the Corporation one sixpence. The late Earl of HARDWICKE has, for several years past, realized a very considerable annual sum in coprolites from his Cambridgeshire estates, without making any diminution in his rent roll. I believe I am correctly informed when I tell you that coprolites have been found under Wimpole Park, close up to the mansion, and under the magnificent avenue of elms ; but I trust the time is far distant which shall see them excavated except, perhaps, by some system of mining which may be introduced hereafter.

Coprolites have, in numerous instances, increased the value of small benefices. Many legal opinions have been taken, and contradictory views expressed, as to whether

coprolites come strictly within the definition of the term "minerals," as set forth in ecclesiastical law. I believe it has been held, and is now a generally recognized principle, that if an incumbent sell the coprolites in his glebe estate, he cannot put the sum realized by such sale into his own pocket, but must invest the money for the benefit of the living, or spend it in improving the parsonage house, buildings, chancel of the church (if a rectory), or glebe estate.

I have made a slight allusion to coprolites having been found in Bedfordshire and Hertfordshire. That they have been discovered and excavated from the high lands on the summit of Sandy Warren, in Bedfordshire, on property belonging to A. W. PEEL, Esq., M.P., is very extraordinary; and I have as yet heard no reason given by any scientific authority for their being found in this elevated situation.

The vein, here, is very thick, but the quality is almost identical with the Suffolk coprolite.

A seam of fossils is also found near to Hitchin; and we have let land for excavation in and immediately around that district.

The coprolite pits, which have been opened at Wicken, in Cambridgeshire, close to the bank of the Cam, are very remarkable, the vein being within about 4 feet of the surface, and of enormous thickness and extent, yielding at least 2,000 tons to the acre; but the fossils are not of so good a quality as the Cambridge stones. They contain only about 25 to 30 per cent. of superphosphate, and are of a browner colour and smoother texture than the Cambridge fossil, and are also very much intermixed with gravel and pebbles, so that they require to be hand-picked by women and children,—a very expensive process. These coprolites are worth in the market about 25s. to 30s. per ton.

The Soham, Thetford, and Stretham coprolites are also of this class; but they are not found in such great

quantities. Their value never exceeds £100 per acre, and rarely reaches it.

I shall now briefly explain the mode adopted in raising these fossils, and the various processes they undergo before they are in a fit state to be taken to market and sold to the manure manufacturer.

The position and direction of the vein having been approximately ascertained, the top soil is removed, and barrowed back on to the land which is beyond the limits of the vein, and is technically called "dead." A deep excavation or trench is then made in a vertical direction to the seam of coprolite. The marly deposit from 3 to 15 inches in thickness, in which are the phosphatic nodules, is then dug out and carried to a washing mill, which is generally erected on the works.

The perpendicular cliff, thus formed by the opening of the trench is, after the top soil has been removed and preserved, undermined and split off by crowbars and pickaxes, the material barrowed across the trench to the opposite side, where the work commenced, and the vein of nodules then dug out, and thrown up to the surface, and filled into waggons, which are usually conducted, by a tramway, to the washing mill.

The washing mill is elevated on a circular mound, raised considerably above the level of the adjoining land, in order that the "slurry" or watery mud from the washing may find its way, by gravitation, along artificial channels on to the land which has been excavated, and thus form a layer over the substratum, which has been barrowed back from the workings and properly levelled; the slurry or mud is run on to the land to an even depth, and, when it is sufficiently dried and hardened, the top soil is carted or barrowed over it, and the land levelled and left in a perfect state, fit for the uses of husbandry.

When natural means are not at hand to provide water, of which a large supply is required for the washing of the fossils, it becomes necessary to sink a well on the land; but sometimes the water from the substratum, which has to be pumped out of the diggings, supplies the mill.

The washing mill is either worked by steam or horse power,—more frequently the former,—and consists of a mound of earth, commonly the removed top soil, with a circular trench cut in it of about 15 feet diameter, cased with iron plates, in which a number of instruments very much like large iron harrows, are continually revolving among the fossils with which the trench is partly filled, clean water being pumped into the trench as occasion requires. The washed fossils are then placed in heaps, carted away, and forwarded to the artificial manure manufacturer, who grinds them into powder in a steam mill and sells them, mixed with sulphuric acid and other ingredients as artificial manure.

The value of the Cambridgeshire grey coprolites, in the market, at the present time, is about 55s. per ton: a few years since they averaged about 35s. per ton. The Cambridgeshire brown coprolites, or the inferior kind, are worth from 25s. to 30s. per ton.

The following is a modern analysis of the Cambridge-shire coprolites, by Dr. VOELCKER, kindly furnished to me by one of our largest artificial manure manufacturers:—

Moisture and water of combination		63
*Phosphoric acid		27·58
Lime		44·37
†Carbonic acid		5·31
Other constituents not determined		13·59
Insoluble matter		8·52
		100·00

* Equal to tribasic phosphate of lime 59·60.

† Equal to carbonate of lime 12·10.

Another and more detailed analysis of the Cambridge-shire coprolites by Dr. VOELCKER, is as follows :—

Moisture and organic matter	4·68
Lime	43·21
Magnesia	1·12
Oxide of iron	2·46
Alumina	1·36
Phosphoric acid	25·29
Carbonic acid	6·66
Sulphuric acid	·76
Chloride of sodium	·09
Potash	·32
Soda	·50
Insoluble silicious matter	8·64
Fluorine and loss	4·96

The analysis of the true Suffolk coprolites, also made by Dr. VOELCKER, is :—

Water less on heating	5·07
*Phosphoric acid	24·46
Lime	38·01
Oxide of iron and alumina	—
Magnesia, carbonic acid, &c.	22·59
Insoluble silicious matter	9·87
	100·00

* Equal to tribasic phosphate of lime, 53·39.

It is obvious, from the above analyses, how valuable are the chemical properties of coprolites for the manufacture of artificial manures ; indeed, so much are minerals containing

the above properties sought after, that artificial manure manufacturers are turning their attention to continental countries, and opening works for obtaining rocks containing phosphate of lime in France, Germany, Switzerland, Norway, and Sweden.

I will now briefly refer to a few of the clauses which are generally inserted in coprolite agreements, for the proper regulation and management of the works. The chief covenants are as follows:—

- (1) Covenant.—As to price per acre to be paid for the right to dig, the number of acres to be excavated in a year, and the time the works are to be finished by. Also the payment, per acre, to the occupying tenant for the land kept out of cultivation.
- (2) Covenant.—If, in excavating the coprolites, gravel is found or raised, it is to be paid for at a stipulated price per yard.
- (3) Covenant.—To set apart the top soil to a depth of not less than—say 16 inches, keep it clean and free from weeds and rubbish, and cultivate the same. Level the subsoil, which is turned over to get at the coprolite vein, and run over it the “slurry,” or soil discharged from the washing mill,—then spread on the preserved top soil of an even layer and thickness; restore and perfect the land, fit for agricultural purposes, by a certain date.
- (4) Covenant.—To allow machinery and mill to be erected on land, and power to sink a well.
- (5) Covenant.—To allow the waste or refuse water arising from the washing of the coprolites to be conveyed from the land clear, as near as may be,

into the nearest public stream or water-course into which it may be lawfully conveyed, with power to dig trenches and cuts to convey the same, leaving all restored at the end of the time.

- (6) Covenant.—For the maintenance of the fences, ditches, gates, and pales; and also the usual penal clauses and stipulations as to payment of rent, power of distress, &c.

There is only, as it appears to me, one other portion of this subject which I need briefly touch upon, namely, what proportion of the value of coprolites, as minerals, is due to the lord of the manor, where they are excavated from copyhold lands, or where lands are enfranchised which are known to contain a vein of these fossils.

I believe the practice is, and has usually been, to set apart, in the first place, for the copyhold tenant, a fair sum for the surface damage to the land kept out of cultivation in getting the coprolites, from the amount paid for the right to excavate the coprolites, and then to divide the residue between the lord and the tenant; the sum thus set apart generally amounts to about one-third of the value of the vein per acre; therefore, if the coprolites realize the sum of £100 per acre, the copyhold tenant or owner of the land would have two-thirds of that sum, and the lord of the manor about one-third. Circumstances alter cases; but this may, I think, be taken as a general principle.

It remains for me now to thank you for the kind attention you have given to this Paper, and to apologize for its too superficial character, and its want of originality. I can only add that if it should be the means of promoting discussion, and bringing forth fresh knowledge on this interesting subject, my task will not have been accomplished in vain.

Professor VOELCKER (Visitor), responding to the invitation of the Chairman, said that he had listened with great interest to the highly instructive Paper of Mr. BIDWELL, and he was sure the Society would feel greatly indebted to him for the clear manner in which he had given them so much valuable practical information on the coprolite beds of Cambridgeshire. There seemed to be great doubts as to the origin and real nature of those remarkable mineral substances, but appearances seemed to indicate them as being the remains of organized bodies or animal matter, but of what description no one could tell. Suffice it to say, coprolites are the mineralized portions of animal bodies, chiefly consisting of phosphate of lime. This phosphate of lime appears to have been formed, in most cases, in other localities than those in which coprolite beds are found at the present day; for this phosphatic mud proved, on examination, to be mixed up with oxide of iron and alumina, in other instances with a considerable proportion of carbonate of lime, and in some cases with a large quantity of silicious matter, showing that the phosphatic mud, arising from the final decomposition of various kinds of animal matters, had been mixed up with clay, chalk, and sand deposits. This mud appears to have covered up certain strata in Cambridgeshire and adjoining counties; for it is by no means uncommon to find fossils, with the original shells consisting of carbonate of lime, still attached to them, filled up with phosphatic mud,—with the same matters which formed the principal mass of the nodules. In other cases the so-called nodules were found almost entirely composed of the casts of shell-crustacea. Thus, in some localities, there existed whole beds of ammonites, phosphatized, and some retaining portions of the original shell, consisting of carbonate of lime; but the mass consisted of the phosphatic mud which occurred in adjoining fields in the form of nodules. In other instances, coprolites

of the elongated form abounded,—the form which first gave rise to the name of coprolites, on the hypothesis that they were excrementitious matter rounded off by the action of water; indeed, some of these nodules contained curious organic forms, completely fossilized and phosphatized. He had in his collection specimens of coprolites from most of the localities where they occurred in England, from the extensive series of coprolite beds of France, and also from Germany and Russia. There appeared to be large deposits of coprolites in the latter country, resembling in composition the Cambridgeshire coprolites, but as yet no deposit had been found equal to that of Cambridgeshire. The composition of the Cambridgeshire beds was almost uniform throughout; and, consequently, their value was more fixed than that of the beds which were found in other localities. With the permission of the Meeting, he would make a few remarks upon the practical value of these coprolite deposits. He need hardly observe that their value depended, irrespective of variation of depth, and different degrees of facility of working, &c., mainly upon the per-centage of phosphate of lime which they contained. There were also other considerations to be taken into account in estimating their value, such as the amount of carbonate of lime, oxide of iron, alumina, and sand, which they contained. Of these components, that which principally determines the value of the coprolites is the per-centage of phosphate of lime; next to that, the oxide of iron and alumina; and next to that, the carbonate of lime, sand, and silicious matter: for, in the manufacture of coprolites for artificial manures, the acid employed for dissolving them, and making them available for the purposes of artificial manures, before acting upon the phosphate of lime, is partly neutralized by oxide of iron and alumina, or carbonate

of lime. He might be asked why oxide of iron and alumina were more objectionable than carbonate of lime, since both neutralized and rendered comparatively useless a certain amount of acid? The reason was, that not only did oxide of iron and alumina eat up a certain quantity of sulphuric acid, but it had been found that the super-phosphate, or turnip manure, which was made by dissolving coprolites, containing much oxide of iron and alumina, on being kept for some weeks became poorer in soluble phosphate, and just in proportion as the coprolites were originally rich in oxide of iron and alumina, would the quantity of phosphate of lime in a soluble form become reduced in the manufactured manure. Indeed, the soluble phosphate of the manufactured manure would go back, and as the manufacturer of manures sold the manures mainly on the basis of soluble phosphates, he was careful to manufacture his manures from purely phosphatic materials like coprolites, which were comparatively poor in oxide of iron and alumina. Now the quantity of oxide of iron and alumina in the Cambridgeshire coprolites was so trifling, that the super-phosphate did not go back on keeping to the same extent as the super-phosphate made from the Suffolk or other coprolites, which contained a much larger proportion of those ingredients; consequently a higher price was given for the same per-centage of phosphate of lime in the Cambridgeshire coprolites than was given for the phosphate of lime in the Suffolk coprolites. A certain amount of carbonate of lime was by no means objectionable in the practical working of artificial manures made from coprolites; for it had been found that, on the addition of acid to coprolites containing from 12 to 15 per cent. of carbonate of lime, the resulting super-phosphate remained spongy and porous. He need hardly say that on the addition of sulphuric

acid to powdered coprolites, the carbonate of lime became decomposed; carbonic acid was given off, whilst the insoluble phosphate of lime was rendered soluble. Now this escape of carbonic acid made the mass light, just as in the case of fermented dough it made bread light, a condition desired by manufacturers of artificial manures; therefore any per-centage of carbonate of lime below 15 per cent. was not prejudicial to the value of coprolites; but should the per-centage rise to something like 25 or 30 per cent. of carbonate of lime, they were more or less useless to the manufacturer, because he found that he must use so large an amount of sulphuric acid that the manufacture of the manure would be a profitless operation to him, while the material so produced was of comparatively little value. Then, again, with regard to the quantity of oxide of iron which rendered coprolites useless for practical purposes, no very general data could be given, because the quantity of oxide of iron would be influenced by the per-centage of phosphate of lime; but, speaking generally, he should say that if the coprolites contained more than 10 per cent. of oxide of iron, they were of very little value. This, possibly, would explain the great difference in the practical value of nodules which, to all appearance, were very similar, and which might be supposed, on looking at them, to be pretty much of the same value. Considerable sums of money had been launched by men who had tried to import coprolites from abroad,—especially from France, where extensive beds exist in the Ardennes,—but they did not bear the expense of importation, for the reason that French phosphatic nodules were, frequently, too poor in phosphate of lime, containing, as a rule, not more than 40 or 45 per cent., and comparatively much carbonate of lime. Recently, an extensive deposit

of chalk coprolites had been found opposite to Dover, and in the neighbourhood of Dover itself coprolites had also been found—evidently the same bed extending under the Channel to Calais. He might add, that he should be delighted if any of the Members of the Institution would give him a call at his museum, where he had an extensive collection of coprolites and similar phosphatic materials. In conclusion, he alluded to the extensive deposits of phosphatic minerals in South Carolina, which intimately resembled some of the Cambridgeshire coprolite beds; indeed, he might say, some of the Carolina deposits could hardly be distinguished from Cambridge coprolites. There were the same fossils, of the same greenish-grey appearance, and also a similar composition, in the better deposits of South Carolina. The per-centage of phosphate of lime averaged about 58 per cent., whilst that of the best Cambridgeshire beds was about 61. The South Carolina beds were very extensive indeed, spreading over hundreds of miles; but the expense of shipping to this country was too great to make it a very profitable speculation, so that many importers had given up the enterprise, and, so far as his knowledge went, there was only one firm who brought that material into the English market at the present time.

MR. W. J. BEADEL (Member) said that he had great pleasure in moving a vote of thanks to Mr. BIDWELL for the clear, able, and concise manner in which he had brought the subject before the Institution. He had listened with extreme interest to the remarks of Professor VOELCKER, whose name was so familiar to agriculturists and a terror to those vendors of artificial manures, who were restrained by his analyses from foisting upon farmers a worse than worthless article.

The subject of Mr. BIDWELL's Paper was one particularly interesting to surveyors and land agents, for there could be no doubt that if farmers were to keep pace with the times—if they were to pay increased rents and wages, and incur increased expenditure on the land, they could only do so by making increased profits; and since there was a limit to the amount of manure which could be made upon the farm itself, it was of the highest importance that the nature and composition of the artificial manures upon which farmers had, to so great an extent, to depend, should be distinctly known and understood, and that such fertilizers as were used—whether coprolites, nitrate of soda, or guano—should be of such a quality as to return the greatest amount of produce for the outlay. Moreover, while there were artificial manures produced in this country, available for corn and grass crops, it was surely better to buy them than to go to foreign countries for fertilizers. He found that the value of guano had greatly deteriorated of late, and was very inferior to that imported some years ago. He was obliged, therefore, to seek for other fertilizers, and farmers would be glad to hear that the phosphates of this country were equal or superior to those produced in other countries.

Mr. BIDWELL had incidentally proved a point with reference to which he (Mr. BEADEL) held a strong conviction, but which some people were slow to believe—viz., that the deeper land of any character was cultivated the greater was the agricultural benefit derived. He (Mr. BEADEL) maintained that even poor clay, if so treated, drained deep enough and properly manured, could be made as productive as other land.

Mr. R. P. NISBET (Member) said that he had been

informed that coprolites had been found in several parts of Cambridgeshire where they were not previously supposed to exist. He had inspected some of these beds, and had been struck with their general resemblance to the sea deposits of cockle, oyster, and mussel shells, with which he was familiar in the fen country. These deposits of shells were often met with in cutting drains, lying in heaped-up forms, as though deposited by the sea, tide by tide. Whether there was any analogy between the shell deposits and the deposits of coprolites found in the neighbourhood of Cambridge, lying in similar forms, Professor VOELCKER might be able to decide; also whether these shell deposits contained chemical matters of a kind likely to be useful for agricultural purposes.

Mr. E. P. SQUAREY (Member) said that one misfortune attending this and similar discussions was the disturbance of one's long-settled faith and belief. When he first heard of coprolites, he entertained the belief that they were, as described by Dr. BUCKLAND, the excreta of extinct saurian reptiles. That theory had been rudely assailed, but nothing absolutely definite was offered in place of that which he was called upon to abandon. The distribution of these wonderful minerals was much wider than was commonly supposed. In cutting some drains, he had recently discovered small quantities of coprolites on an estate which he purchased of Mr. BEADEL some years since, at the edge of the green-sand in Hampshire, near Selborne, and now the property of the late Lord Chancellor. They were small, but very like those from the Cambridgeshire beds, and, he believed, of the same character. There was one point growing out of the discussion to which he ventured to call Dr. VOELCKER's attention. He (Mr. SQUAREY) could corroborate the re-

marks of his friend Mr. BEADEL, as to the necessity for the use of extraneous manures, in order to keep up the profitable cultivation of the English soil; but he would ask of Dr. VOELCKER an explanation of his (Mr. SQUAREY's) and other farmers' experience that the super-phosphate of lime made from good honest half-inch bones—which could be tested before applying the sulphuric acid to them—was superior to the phosphate of lime produced from the best Cambridgeshire coprolites? His own conviction, speaking as a practical farmer, was in favour of the super-phosphate manufactured from bones and sulphuric acid, under the eye of the farmer himself, and he should be glad to hear how far Members present endorsed or contradicted that statement.

Mr. M. H. JOHNSON, F.G.S. (Visitor), said that he had given some little attention to coprolites, as forming part of a large group of bodies, which were known to geologists commonly as nodules, and generally described, for want of any real information on the subject, as concretionary—terms which threw very little light upon the matter, inasmuch as there were nodules in all the sedimentary deposits from the tertiary beds downwards, not only phosphatic nodules, or coprolites, but nodules consisting of many other mineral substances. He had examined these microscopically, and also to a certain extent chemically, and would merely state the results. If properly examined, there would, in most cases, be found a silicious skeleton, or basis. This skeleton seems to have been the silification of an organic body, followed by an infiltration into the interstices, sometimes of one substance and sometimes of another. Supposing the silicious skeleton to have been infiltrated with carbonate of lime, the result was a solid

body, like the septaria of the London, Kimmeridge, and Oxford clays. If filled in with carbonate of iron, the result was a clay ironstone. Again, supposing it to have been filled in with phosphate of lime, coprolites were formed like those of the crag and other deposits; if with bisulphide of iron, the iron pyrites' nodules in the chalk; and if with silica, the flints in the chalk. He would not detain the Meeting by describing the methods by means of which he had arrived at this conclusion. They were already in print, and formed the subject of a Paper which he read before the Geologists' Association, and in which he thought that he had thrown a certain amount of light upon the constitution of these bodies. As a group they seemed to consist of a silicious structure, the form of which depended upon that of the organized body replaced, and subsequently filled in and consolidated by other materials, according to the available substance which happened to preponderate about them at the time.

MR. JOHN CLUTTON (Past President) wished to say a word with reference to the proportion of the profit, arising from the digging of coprolites, received by the landlord. He was anxious that it should not go forth from the Institution, as an established rule, that the landlord received only one-third, while the copyholder received two-thirds of the amount paid for the right of winning them. His own experience was that it was customary to divide the amount equally between the parties; this, he happened to know, had been done in Mr. BIDWELL's own district. He had much pleasure in seconding the vote of thanks to the author of the Paper.

MR. C. BIDWELL desired to thank Dr. VOELCKER for the

valuable information he had given, and to Mr. BEADEL for proposing the vote of thanks. He also returned his sincere thanks to Mr. CLUTTON for seconding the vote. Mr. JOHNSON had stated very clearly and concisely the theory as to the manner in which these phosphatic nodules were formed. For his own part, he had avoided any expression of his opinion as to the geological nature of these bodies; the object which he had in view being to give such practical information respecting the coprolites of Cambridgeshire as would be useful to, and come strictly within the province of, surveyors. With regard to what had fallen from Mr. SQUAREY, he had endeavoured all through the Paper to put forward as clearly as possible the now generally received opinion of scientific men, that the so-called coprolites are, chiefly, phosphatized remains of organic bodies. He could thoroughly endorse Mr. BEADEL's opinion with respect to deep cultivation. Land which had been dug for coprolites was vastly improved for the purposes of cultivation, and the corn crops which were grown for two or three successive years on such land was a strong proof of this fact. In conclusion, he begged to thank the Meeting for the kind reception given to his Paper.

Professor VOELCKER said that he should be glad to answer the question put by Mr. SQUAREY. That gentleman observed truly that super-phosphate made from dissolved bones was more valuable than purely mineral phosphates; but there was good reason for it. The bones contained a considerable quantity of animal matter, furnishing, on decomposition, no less than $4\frac{1}{2}$ per cent. of ammonia, and it was principally from the presence of this additional constituent that dissolved bones derived their superior value. As regarded soluble phosphate of lime, it made, of course,

no difference whether it was derived from fossil phosphate or from bones. It was more economical, however, on the whole, to make it from mineral phosphates, because a farmer could not dissolve bones to advantage, as he had to pay a heavy carriage for sulphuric acid. He must buy concentrated acid, and the cost of the final concentration was considerable; whereas soluble phosphate could be produced from chamber acid on the spot; no carriage had to be paid, the cost of concentration was avoided, and the raw material was obtainable at more reasonable cost than it could be obtained in the shape of bones. Moreover, it was necessary to use something more than bone, for the amount of available bone produced in England and other countries on the Continent—and bones were imported from Egypt—was not sufficient to produce $\frac{1}{20}$ one-twentieth part of the super-phosphate used by artificial manure manufacturers. What he recommended his friends to do was to buy soluble phosphate in the cheapest form,—to buy that material which they can profitably produce from coprolites,—and if they wanted a much better sample of dissolved bone than they could buy, to mix the super-phosphate with bone dust. Then they knew they had soluble phosphate, for which they paid a certain price, and the insoluble phosphate in the shape of bone; and the soluble super-phosphate would act upon the bone and make it more friable, by this means producing a more economical and better kind of turnip manure than by dissolving the bones themselves.

The CHAIRMAN said that there had been so much unanimity in the remarks made upon the Paper that he did not feel called upon to exercise the usual function of summing up the discussion. He had much pleasure in conveying the thanks of the Meeting to Mr. BIDWELL for

the excellent Paper which he had read, and to Professor VOELCKER for the extremely able remarks with which he had favoured them.

The Meeting then adjourned.

AGRICULTURAL GEOLOGY.

(No. 2. NORTHERN DIVISION.)

BY E. J. SMITH (VICE-PRESIDENT).

*Read at the Ordinary General Meeting of the INSTITUTION OF SURVEYORS,
May 11th, 1874.*

MR. JOHN CLUTTON, PAST-PRESIDENT, IN THE CHAIR.

IN the discussion on Mr. SQUAREY's excellent Paper on this subject, I observed that the geological formations might be conveniently identified with the letters of the alphabet, and that, whether we pass from hence to Cornwall, or to Wales, or to Cumberland, or to Scotland, we equally pass over a series of formations corresponding to the series of letters between V and A. The igneous rocks form part of the Scottish border, and the granitic rocks are the basis of the Cumberland mountains, and all the intermediate formations, except the old red sandstone, will be traversed between those rocks and the formations already described by Mr. SQUAREY.

In the northern part of England, the formation which attains the greatest height, and governs the climate and the directions of rivers and roads, and affected the course of traffic, is the great mountain limestone and Yoredale rock, corresponding to the letter E; the formation which is the most valuable is the coal formation identified by G; while the new red sandstone formation (marked K) is the most extensive; lying upon the rivers Tees, Trent, Severn, and Mersey, and touching the tidal waters of all the three seas which guard the English shores.

This mountain limestone range forms the Penine chain or backbone of England, the great watershed and high ground of the north with a length of 200 miles and an extreme elevation of 3,000 feet, whence the rivers fall rapidly westwards to the Irish Sea, and, by longer courses, eastwards to the German Ocean, whilst the ancient roads from south to north run along its eastern side, guided mainly by the facilities for passing each successive eastern river.

Bounded to the westward by the igneous rocks which form the Cheviot hills, this mountain limestone range enters England on the Scottish border, and, extending along the eastern coast for about 35 miles, strikes across the western sides of the counties of Northumberland and Durham to Crossfell, 3,000 feet above sea level, and thence enters Yorkshire above Barnard Castle. At Brough there is a remarkable depression of 1,000 feet, through which run the British and Roman roads from east to west, after which the range again rises to 2,400 feet, and throws a northern arm westwards to Cockermouth on the Irish Sea. Brough is nearly the centre of the limestone range from north to south; from Brough to Clitheroë in Lancashire, it continues at its full width; and from Ingleborough, 2,360 feet high, a southern arm is thrown across Furness to the Irish Sea; the main body extending southwards to Ashbourne in Derbyshire, and reaching a height of 2,500 feet in that county. Detached portions of this range appear in the counties of Leicester, Gloucester, Somerset, Carmarthen, Brecon, and Monmouth, generally connected with coal fields; but these portions are comparatively insignificant in extent.

This formation is of more value in a geological than in an agricultural point of view, and is chiefly in pasture; where there is sufficient soil and not too much height or

exposure it is productive as arable, but this is upon only a small portion of the range. On the north side of Crossfell, at an elevation of 1,800 feet, land not worth one shilling an acre has been brought to ten times that value, by cutting surface drains to carry off the rain-water—some 60 inches of annual fall. At Alston, which is 900 feet above sea level, a very narrow strip of land on the South Tyne river may be worth £3 an acre, and this is surmounted by a zone of land worth 30s. to 20s. an acre, and then the hillside runs up to moorland very rapidly. Near here, at a level of 1,800 feet above the sea, the Gildersdale inclosure has remained unaffected for many years, because a recreation ground of 280 acres was considered indispensable. There is no house within 2 miles, and the nearest habitation is 800 feet below the common. Not far from Haydon Bridge, about 500 feet above sea level, Mr. Grey, the receiver for the Greenwich Hospital Estates, has also greatly improved a large extent of land. The sheltered lands along this part of the South Tyne, rising to a level of 700 feet, are now fair arable land, let at from 30s. to 20s. an acre. Lands let on lease at 30s. during the high prices of 1813, were in 1822 obliged to be reduced to 20s. on account of the fall in prices. The greater part of the lower land throughout Northumberland is on this formation, and has been brought into good cultivation, and is admirably farmed at rents averaging fully 30s. an acre. On that coast line are several remarkable peaks of igneous rocks (Bamborough Castle and the ruins of Dunstanborough Castle stand upon two of them), and where these igneous rocks form soil they are very good turnip land, worth 35s. to 40s. an acre. They are, however, of small extent.

From Barnard Castle to Clithero, and, indeed, wherever the elevation of the limestone range exceeds 700 feet above the sea, this formation is almost wholly in pasture; but there are variations in its character. Near Skipton and throughout

the Craven district, it carries very good grass, worth 30s. an acre on the high grounds, and 70s. in the dales, and generally along its eastern side, where it is at all sheltered, it is fair pasture if well cared for. The western side is exposed and precipitous. The northern arm to Cockermouth (crossed at Shap by the Lancaster and Carlisle Railway) being chiefly at a high level, and subject to great exposure, is, perhaps, the portion least capable of improvement. The southern arm crossing Furness, where not too much exposed to the westerly winds, presents, on the contrary, some of its most favourable cultivation, for the range falls rapidly to Morecambe Bay, and this portion is good land, chiefly under arable cultivation, at rents of fully 30s. an acre. As a general rule, altitude and exposure have more to do with the unproductiveness of this formation than its natural character; for wherever limestone soil on any formation has depth, the grass is sweet and healthy, and sheep farming can be profitably undertaken. There is very little residential value attaching to any part of this range, except where mineral springs have brought a population for medicinal purposes. On its western side, at sea level, the rainfall ranges from 32 to 65 inches yearly; while on the eastern side, at sea level, the rainfall ranges from 20 to 40 inches yearly. The western side, therefore, is more suitable for the growth of grass, and the eastern side for the growth of corn. The Government returns of agricultural produce have for some years been divided into two parts, the one headed grazing, and the other corn; but the grazing division includes Northumberland, Durham, and the North and West Ridings of Yorkshire, on account of the large proportion of mountainous land within them—the elevation and latitude occasioning a climate ill suited to the growth of corn.

As regards minerals, this mountain limestone range

comprises at the Derbyshire end four limestone strata, 1,800 feet thick, with three layers of basalt, 360 feet thick, with some lead ore and zinc. But as the range continues northwards, the limestone strata part from each other, and the basalt wears out, until in the vicinity of the junction of the three counties of Durham, Cumberland, and Northumberland, the limestone strata lie apart in sixteen beds, with 700 feet of sand and shale between the highest and the lowest, while the basalt is confined to one bed, 120 feet thick. At this northern end are lead ore, zinc, and some copper, and the lead ore has been so largely recovered that one-fourth of the whole annual supply of English lead has come from it. At this point also large detached ranges of iron ore, better in character than the Cleveland ore but not equal to the hæmatite iron ore, are found. At this point also seams of coal put in as the limestone thins out, and one of the best house coals is found in part of this range, although at all other points the seams contain comparatively inferior coal. I may add that the limestone strata continue to diminish after entering Scotland, and the coal strata to increase, so that in Scotland the greater part of the house coal is derived from this formation. These coal seams have nothing whatever to do with the Newcastle or with any other of the English coal fields, being part of a previous geological formation.

Near the western extremities of both the arms of this range is found that most valuable iron ore called hæmatite. There are no certain surface indications, but pots or bowls of hæmatite iron ore, without connection with each other, or anything to indicate whether any one will prove to have only a trace of iron ore, or will extend to 50 or to any larger number of acres, are found and worked. This ore on the surface may be worth 30s. a ton, and by this iron ore has been raised the newly erected borough of Barrow-in-

Furness. It contained 200 inhabitants in 1851, and in 1871 returned to the census a population of 18,585 persons. In this borough a single order to build 1,000 new houses has been given, and each house has been occupied as soon as finished.

Having taken as our central basis the great mountain limestone range passing down the centre of the north of England, we shall find on the western coast that many earlier formations are altogether absent, and on the eastern coast that three steps take us from the oolitic series marked N, to alluvial soil marked Z; an interval which, in the south-east of England, requires all the intervening letters of the alphabet. I will first remark upon the country westward of the range to the Irish sea.

There are three granite rocks in Cumberland (marked A) and at the central point where Cumberland, Westmoreland, and Lancashire meet, there is the green slate and porphyry rock (marked B), and this appears to be the centre of disturbance which brought upon the surface the Cumberland mountains and their accompanying lakes. Agriculturally, this area is of little value; but for residential purposes many sequestered nooks and sheltered lake-side spots are of a value dependent entirely on the enthusiastic temperament of the purchaser. Nothing is more thoroughly enjoyable than a well selected residence in the lake district.

On its northern side this green slate has the before-mentioned northern arm of the mountain limestone immediately upon it, and the coal measures (marked G) are immediately below the mountain limestone. The upper silurian, and the old red sandstone, and the millstone grit, above the coal, and the magnesian limestone below it (denoted by C, D, F, and I), are all certainly absent in this district. These coal measures were long used only for local

consumption and for the supply of coal to Dublin. Some mines are 1,000 feet deep, and have, in part, been worked under the sea for many centuries, and at one point the workings extend nearly two miles from the shore. Occasionally the sea breaks in and drowns a colliery—the last instance was in 1837. The coals are now worked also further inland, as the facilities for railway carriage have rendered inland pits commercially practicable.

The coal measures rest directly upon the conglomerate sandstone (marked H), and this upon the new red sandstone (marked K)—the rock which lies lowest between the sea and the Cumberland hills, and chiefly along the courses of the rivers. The Valley of the Eden contains as good land as any in the north, letting at from 70s. to 40s. an acre, and good feeding land is found along the rivers; but the greater part of the higher land of the district is arable, ranging from 10s. to 30s. an acre, surmounted by pasture land of little value, and by mountain moorland. There are many residential situations within this area, but they are not easily accessible from the great centres of wealth.

Reverting to the before-mentioned central point, where Cumberland, Westmoreland, and Lancashire meet (marked B), and proceeding southwards instead of northwards, the green slate rock is followed by the upper silurian (marked C), which is entirely wanting on the northern side, and which is divided into four sections, and this rests upon the mountain limestone. The old red sandstone, and the millstone grit, and the coal measures, and the conglomerate sandstone, and the magnesian limestone (denoted by D, F, G, H, and I), are all absent, and the new red sandstone (marked K) rests directly upon the mountain limestone before referred to. This new red sandstone extends southwards over the western side of the whole county of Lancaster, and is low-lying, (seldom more than 100 feet above sea level,) fertile,

sheltered from the east winds, and subject to much rain, and is specially fitted for market gardens. The district in Lancashire, called the "Filde," has for many generations been famed for its fertility; a great part is in pasture, and there are many portions possessing a high residential value, as well as the more immediate vicinities of the great towns and of the city of Manchester.

This new red sandstone continues southwards from Lancashire through Cheshire to the tidal level on the Mersey.

Cheshire is, as you are aware, the great dairy county. About four-fifths of the dairy farms are in grass, the other fifth providing the straw and the turnips, and a good dairy farm may average a rent of 38s. an acre. The land runs naturally to grass, so that a grass field, which if ploughed up in Yorkshire or Nottinghamshire would take twenty years to restore itself, would in Cheshire become, in four years' time, indistinguishable from old pasture.

The new red sandstone continues to Staffordshire, and then sweeping round at the lowest level which would effectually create a watershed, unites with the Derbyshire, Nottinghamshire, and Yorkshire red sandstone plain, which reaches the tidal level on the Trent, the Ouse, and the Tees, while another portion runs down southwards from Staffordshire to the tidal level of the river Severn. This formation is sometimes a thick sandstone, and there the land is sought after for building purposes, and is very costly.

The millstone grit (marked F) appears on this western side, chiefly between Clithero and Preston, on the edge of the mountain limestone, and the conglomerate sandstone and the magnesian limestone (marked H and I) are, I believe, altogether absent. The coal field, which we shall presently find on the eastern side of the mountain limestone, seems to have been broken through by its upheaval, and is in full

force on this Lancashire side. This Lancashire coal field still contains 5,000 millions of tons of coal, and if the coal in the whole of the seams existed under any one acre, and could be produced at the same moment on the surface, its value would exceed £4,000. Preston, Blackburn, Bolton, Bury, Rochdale, St. Helen's, Manchester, and the other western manufacturing towns owe their existence to this coal, and depend entirely upon its cheap production.

I will now leave altogether the western side, and pass in review the formations to the eastward of the mountain limestone. The several formations, from the mountain limestone to the upper oolite, appear successively on the coast of the German Ocean, and extend in a south-westerly direction as does also the chalk formation. The millstone grit (marked F) fails to proceed further southward than Derbyshire; the coal (marked G) extends with intervals as far as the Bristol Channel; the conglomerate sandstone (marked H) exists as far as the magnesian limestone extends, and both fail to appear further south than Nottinghamshire. The rest of the formations run through from the German Ocean to the Dorsetshire coast.

Along the east side of the mountain limestone, from the German Ocean to Derbyshire, lies the millstone grit (marked F). Three miles, perhaps, in width from the coast at its northern extremity, it rises to an elevation of 1,800 feet, not far from Brough, about 20 miles south of the highest elevation of the mountain limestone at Crossfell, and forms the eastern side of the Yorkshire hills, by Hawes, Middleham, and Halifax; one portion crops out under the limestone near Chesterfield, and another east of Macclesfield, near Cheadle. In Lancashire it is found, as before stated, from Clithero to Preston, and it runs up again to Ingleton, where a little detached plot of coal is found above it. There is little agricultural produce upon it, and, in many parts, there is peat

moss, which may become valuable when our coal is exhausted, —but not till then; and a part of the range is valuable only for grouse. From want of staple and its poor character, the arable and pasture land of this formation is far less improveable, agriculturally, than those of the greater part of the mountain limestone, but lying at a lower level it is more sheltered. Nor are there any mineral treasures within it. The portion immediately to the south of the Tees is, however, full of residential mansions of great antiquity, lying between the Roman roads, which passed from Catterick to Wallsend at the eastern, and to Carlisle at the western end of the Roman wall.

Next to this formation follow the coal measures (marked G), to which we owe our commercial prosperity for the last 100 years. The certain exhaustion of our coal in a very few years, in consequence of the enormous consumption to be occasioned by the use of steam engines, was one of the griefs of the author of the Agricultural Survey of Lancashire, in 1793. But the use of these steam engines enabled the recovery of thousands of acres of deep coal, and added fuel for 400 years. This formation contains little land of much agricultural value, its general characteristic being a cold, poor, wettish clay; when in pasture, full of carnation grass; and when in arable, expensive to cultivate. Lime is the only alterative calculated to render it productive, and is generally to be obtained at a moderate cost. Well limed, well drained, and well farmed, the soil is remunerative; and as soon as the tenant saves money, he invests it in coal mines and gives up farming. The high price of labour, consequent on the contiguity of the coal mines, is met by the ready sale of the produce when the land lies among the collieries; but the cost of labour, at a slight distance from the collieries, has long been to northern agriculturists an item of more importance than

it has been, even during the late scarcity of labour, in the southern counties.

The leading coal fields, within my limits, are those of Cumberland and of Lancashire before mentioned, of Durham, of Yorkshire and Derbyshire, of Staffordshire, and of Leicestershire, in addition to the first-mentioned Northumberland coal field on the mountain limestone. There are reasons for believing that all these (except the last) once formed one continuous coal field.

The Durham coal field was certainly worked 700 years since for the London market. It comprises about 1,000 miles square, with two remarkable arms: one less than half a mile broad running due west, near the South Tyne, for 30 miles; and the other extending along the coast of Northumberland due north from the main field for a distance of 20 miles, with an average width of 8 miles.

The main body of the Durham coal crops out on the western surface, against the millstone grit, reaching its most distant point from the sea in the neighbourhood of Raby Castle, and gradually falls to a level of 1,500 feet below the surface of the land under the sea coast at Sunderland. It contains about 5,500 millions of tons of unexhausted coal, and the present rate of yearly consumption is about 28 millions of tons.

The coal measures have been washed out from beneath the southern part of Durham and the northern part of Yorkshire, so that there is a distance of 60 miles between the southern end of the Durham coal field and the northern end of the Yorkshire coal field, which also crops out on the millstone grit, and falls eastwards, and there is no coal pit east of Rotherham. But there is no geological reason why the coal should not be found further eastwards. The Yorkshire and Derbyshire coal field is one continuous range, extending 80 miles in length, and containing 1,800 square

miles. Its unexhausted contents would be moderately estimated at 25,000 millions of tons, and the present consumption is about 25 millions of tons yearly.

The Derbyshire and Nottinghamshire portion has only been largely developed since railways afforded facilities for the sale of its coal, and of the produce of its iron furnaces. New pits are now in course of being won in these districts, equal to one-fourth of those in existence within them before the late coal famine. If the Shire Oak Colliery, 1,600 feet deep, lies in the centre of the Nottingham coal basin, and the seams rise (as is suggested) to the eastward, the whole of Nottinghamshire along the Trent, and of Lincolnshire nearly up to Lincoln, may contain workable coal. But this is very doubtful.

The little but valuable North Staffordshire field lies 30 miles from the Lancashire and the Derbyshire coal fields, in a basin, with iron furnaces and the potteries upon it. This coal is chiefly used for manufacturing purposes, and no other article used in the manufactures for which the potteries are famous is found within the district. The china clay comes from Cornwall, and the pottery clay from the coast of Dorset.

Separated from the North Staffordshire coal field by a distance of 30 miles, the South Staffordshire coal field, recently enlarged by the Cannock Chase district, is next to the southward. The distinguishing feature of this district is the 10 yard or 30 foot coal, on which its prosperity was founded. This seam, which is now for the greater part exhausted, divides, as it passes to the north-east, into several seams. The coal was very shallow over a great part of this South Staffordshire district, and was, therefore, won very cheaply. The shale lies upon the surface for miles together, rendering the land incapable of cultivation. Many acres are in possession of tithe-owners, because the tithe rent-charges on them are not

paid; but the possession is worthless, and the tithe rent-charge is irrecoverable. The land cannot be made available for any purpose.

The Leicestershire coal field is deserving of special mention. Charnwood Forest is formed of the green slate and porphyries, which we met with in Cumberland (marked B). On each side of it is a small coal field, at Moira on the east and Coleorton on the west, identified like the other coal fields by the letter G, and the intervening portions of the series of formations between B and G are wanting, or are too insignificant to be recognized. The seams of coal are 50 feet thick at Moira, and 40 feet at Coleorton. At Moira, at a depth of 600 feet, is a salt spring of a character very much resembling sea water, and it is raised and carried to the medicinal baths at Ashby de la Zouche. The only other case of such a spring is in a coal seam under the bed of the sea on the Durham coast, and there, as here, the water, although as salt as sea water, is composed of different ingredients.

The worst clay land I know is upon the Durham coal field. The consumption of produce by the towns of Newcastle, Shields, Sunderland, Durham, and Stockton, and by the masses of colliery population scattered about, keep the greater part of the district under arable cultivation, at rents of from 10s. to 30s. an acre.

The same character pervades the other coal fields. Leeds, Wakefield, Sheffield, and the other manufacturing towns of Yorkshire keep up its rental value, and the masses of population congregated at the ironworks of Derbyshire operate in like manner; but the shale and sandstone of the coal series are ungrateful to the agriculturist. Colliery sites pay at least double agricultural rents, frequently more; and when collieries require special accommodation, they have to pay accordingly.

The conglomerate sandstone (marked H) is almost

altogether absent on this side of the Penine range, and very difficult to distinguish when present.

The magnesian limestone range (denoted by I) follows the coal series on its eastern side, from the sea coast at Sunderland to nearly the southern side of the county of Durham, where the limestone has been washed out together with the coal formation. Along the Tees, the new red sandstone lies directly upon the millstone grit, from whence it is evident that the coal series and the magnesian limestone are at that point both absent. Borings have been recently made 3 miles north of Darlington to the depth of 600 feet, which have confirmed the expectation that the millstone grit underlies the new red sandstone at that point, and consequently that there is no coal there.

The magnesian limestone is found again about 20 miles southwards at Bedale, and extends thence to Nottingham. On the eastern side of the part in the county of Durham, this formation is covered with clay and is generally poor; but about Staindrop, and along the Tees Valley, and during the rest of its course, it is good farming land, and well repays spirited cultivation, being worth sometimes 40s. an acre, as arable land; but the value of this range may be taken as varying from 20s. to 30s. an acre, according to the depth of soil. It is a favourite residential soil, especially the eastern side, which overlooks the new red sandstone plain to the eastward.

East of the magnesian limestone, we return to the new red sandstone (denoted by K), which we found to a small extent in Cumberland and largely in Lancashire, Cheshire, and Staffordshire. The portion adjacent to the magnesian limestone is residential in character, as well as those portions which attain a higher level in Nottinghamshire and other counties. This is attributable to the sandy nature of those parts of the formation, which otherwise is of a purely agricultural,

although very various, character. On the north side of the fertile valley of the Tees, the calcareous particles having been washed into it, it is generally good ; but, beyond the reach of ancient floods, it is very heavy clay, expensive to cultivate. On the southern side, the bank of the Tees is less than 150 feet above the level of the sea, and the land falls continuously to tidal level at York. It is a cold clay soil throughout this range, better fitted for pasture than for arable on account of the cost of cultivation, but producing a poor thin herbage. The rents vary from 18s. to 30s. an acre. In the vicinity of towns and villages, where continuous management for centuries has to a certain extent modified its character, and in some other special situations, the produce is good. Liming is indispensable, and thorough drainage relieves it of superfluous moisture, but it is very subject to the uncertainties of the seasons.

In Nottinghamshire, on the forest, this formation is a light sand, very agreeable for residence and, cultivated by sheep-farming, ranging from 20s. to 30s. an acre, and in the plain it is generally a cold strong clay, chiefly in arable, worth on an average 24s. an acre.

In Warwickshire, it is, in some parts, perfect land for residence and for farming ; in others cold clay, and the same in Worcestershire.

The rent on land on this formation well farmed, should seldom be less than 18s. an acre, while £3 an acre may be regarded as the highest rent except in very exceptional cases.

The mineral products of this formation are gypsum and salt. The former has been for many years worked in Cumberland and in Nottinghamshire, and the latter in Cheshire both as rock salt and as brine springs. Attempts are now being made to recover it at the south-east corner of the county of Durham ; the existence of a good salt bed at that

point having been proved, and the question being only one of cost.

The *lias*' (marked L) commences at the east coast, at the northernmost point of Yorkshire, and extends, almost uninterruptedly, in a narrow band to the south coast at Lyme Regis, in Dorsetshire. It is, in the north, for the most part cold wet clay, with bands of limestone a few inches thick within it, and abounding in saurian remains, and is worth from 15s. to 25s. an acre to rent. The greater portion is in pasture, for which it is best adapted. Where the soil is immediately upon the stone, or where it is a loam rather than clay, it is productive, and such is its character in parts of Leicestershire, and in the dairy districts of the west of England. The highest rent in proportion to the gross farming produce of land probably arises in the southern dairy districts on this soil.

The lower oolite (marked M), the next in order to the south-east, is very various in its character between the coasts of Yorkshire and of Dorsetshire. It is in the centre and south, a brown dry soil through which the rain-water runs until it meets, and is thrown out by, the *lias* clay below. It follows that the greater part is under arable cultivation, and that it affords fair and moderately certain returns. The rents vary from 25s. to 35s., or even 40s. an acre. Throughout its course there are ironstone beds. The great value of the iron ore near Middlesborough is due in part to the proximity of the Durham coal, and of the water carriage of the Tees, and in part to the quantity of the ironstone to be readily obtained by open working on the face of the hills or by drifts of very moderate depth and extent. At this northern termination of this range, the hills rise to an elevation of 1,500 feet abruptly from the valley of the Tees, and form a table land of the wildest kind, over the space of 300,000 acres, in the triangle be-

tween Whitby, Pickering, and Middlesborough. In other parts, the elevation of this range is inconsiderable.

Middlesborough contained in 1831 431, and in 1871 39,415 inhabitants, and is to the east coast what Barrow is to the west coast.

The intersection of Northamptonshire by railways has brought into value the ironstone long known to be present at that portion of the course of this formation, and there is no geological reason why this ironstone should not be found at the southern end of the formation, and carried to the coal of South Wales and of the Forest of Dean.

In Yorkshire, the coral rag, and Oxford clay (marked N), are found, in the northern part of the North Riding, only at the base of the Cleveland Hills; but they re-appear on the south of the Humber,—and the whole of the fen country south of the Humber, across the Wash to Huntingdon and Ely, is based upon the Oxford clay. The value of the fen land is maintained by the occasional digging-up of the Oxford clay beneath it, and its incorporation with the present soil—a process costing on an average about £4 an acre. The rental of fen land depends chiefly upon the outgoings for drainage rates, otherwise, from 40s. to 45s. an acre would be the average rental.

In Yorkshire, also, the Kimmeridge clay (marked O) is found only along the rivers Rye and Derwent, above Malton. A very narrow bed crosses the Humber, and is a little more pronounced south-east of Horncastle; but, practically, this formation is absent until it re-appears near Aylesbury.

One of the distinguishing geological features of this Yorkshire and Lincolnshire coast is the total absence of the whole of these formations between the Kimmeridge clay and the chalk, which, in the south of England, lie south and east of the chalk, and constitute one of the leading fields for geological investigation and discussion.

The Portland and the Purbeck limestones, the Weald clay, and the Hastings sands, even the lower green-sands and the gault, are all unknown beyond the Lincolnshire Wash, while the upper green-sand is a narrow band not always to be distinguished.

The chalk (marked S) follows almost immediately on the Oxford clay (marked N), and constitutes one of the best cultivated and most profitable farming districts in England. From Filey to Burgh near Wainfleet, may be 160 miles, and the chalk range may average 10 miles wide, and it would be very difficult to find an ill-managed farm throughout the whole extent. Whether you think Yorkshire or Lincolnshire chalk farming the best, depends upon which side of the Humber you are born. You may take a hard day's ride on the one side or on the other without seeing any property which is otherwise than a credit to its owner and to its tenant. The rents range from 25s. to 40s. an acre.

On leaving the chalk, the other distinguishing feature of the Yorkshire and Lincolnshire coast presents itself. The whole of the formations which in the south of England, interpose between the chalk and the alluvium (marked Z),—the London clay, the Bagshot beds, the crag, and the drift,—are all absent, and the alluvium rests directly upon the chalk. Originally extending much further into the present sea, opposite Easington in Yorkshire, this alluvial soil has been deposited at the foot of the chalk hills between them and the sea, and is called, in Yorkshire, Holderness, and in Lincolnshire, the Marsh. Some of these lands may hold their own against Somersetshire and Devonshire pastures; all maintain the proverbial fertility of alluvial soil. The last accretion is that of Sunk Island, one of the most valuable of the agricultural estates of the Crown. It comprises 6,600 acres on the north side of the

Humber, and has been almost wholly recovered within the last 200 years. About 1660 it contained 12 acres; about 1740 it comprised 1,550 acres; about 1810 it contained 4,500 acres, and in 1854 about 6,600 acres. It has been under the charge of Mr. HIGGINS from that time to his recent decease, and is held in fourteen farms, with some small tenancies, at rents amounting to more than £12,000 a year. It was open to general inspection at the Royal Agricultural Society's Meeting at Hull this year; the buildings, cottages, roads, fences, and general arrangements having been made by Mr. HIGGINS after 1854, in the most perfect manner compatible with a proper return upon the capital expended. I shall have pleasure at any time in enabling any Member or Associate of the Institution to view this property.

In conclusion, speaking however imperfectly on geology, I should neglect a duty if I failed to remind you that, since we listened to Mr. SQUAREY's Paper, we have lost Professor PHILLIPS, one of the most accomplished geologists, antiquarians, and naturalists of the period. I would impress upon the younger Members of the Institution that, in the journeys which they necessarily take, any acquaintance with the geology, or the antiquities, or the flora of the districts, will add a charm to their professional labours, and, not unfrequently, be of great value to them in their professional career.

Mr. R. B. GRANTHAM (Associate of Council) begged to move a vote of thanks to Mr. SMITH for his able and interesting Paper. He could quite endorse Mr. SMITH's remarks with reference to the importance of this study to the younger Members of the Institution. It was one which they could prosecute as they travelled in pursuit of their calling through the various parts of the country.

It was his constant practice, and he had found it most instructive and interesting, to carry a geological map with him on his journeys, and trace, with its assistance, the different formations distinguishing the districts through which he passed.

Mr. R. HORSFALL (Member) had great pleasure in seconding the vote of thanks. As a native of the north of England, and well acquainted with its agricultural and mineral characteristics, he had followed with great interest the description given by Mr. SMITH, and could, in the main, endorse the author's estimate of the agricultural value of the land in the localities referred to in the Paper. He hoped the Paper would be circulated in the north of England, and might be the means of inducing many Surveyors practising in those districts to join the Society.

Mr. E. J. SMITH having thanked the Meeting for the kind manner in which his Paper had been received, expressed a hope that, on some future occasion, other Members would be found willing to assist in filling in the outline which he had sketched, with further information as to districts with which they were specially acquainted, so that in time the Institution might possess a complete survey of the agricultural geology of the country.

The vote of thanks having been passed unanimously, the Meeting adjourned.

THE ANNUAL GENERAL MEETING,

Monday, June 1st, 1874.

RICHARD HALL (PAST PRESIDENT) IN THE CHAIR.

Messrs. J. H. CLUTTON and F. W. CARDALL having been requested to act as Scrutineers of the ballot for the Election of Council, the balloting list submitted by the Council, in accordance with the bye-laws, and the record of attendance of the Members of Council, were read, and the ballot declared open.

The Report of the Council on the state of the Institution, and the Statement of Receipts and Expenditure for the year 1873, were read.

RESOLVED—"That the Report of the Council and the Balance Sheet be received and approved, and be printed and circulated with the 'Transactions.'"

RESOLVED—"That the thanks of the Institution be given to Messrs. A. GARRARD and R. VIGERS for the efficient performance of their duties as Auditors, and that they be requested to continue their services for the ensuing year."

RESOLVED—"That the thanks of the Institution are due, and be given, to the President, the Vice-Presidents, and the other Members and Associates of Council, for the able manner in which they have administered the affairs of the Institution."

RESOLVED—"That the thanks of the Institution be given to Mr. JOHN WORNHAM PENFOLD (the Honorary Secretary), to Mr. JULIAN C. ROGERS, to the Treasurer, and other Officers of the Institution, for the manner in which they have executed their several duties."

The ballot having been closed, the Scrutineers reported that the following gentlemen had been elected as Council for the ensuing year:—

President.

THOMAS HUSKINSON

Vice-Presidents.

JEREMIAH MATHEWS

EDMUND JAMES SMITH

JOHN OAKLEY

WILLIAM STURGE

Members of Council.

WILLIAM JAMES BEADEL

CHARLES JOHN SHOPPEE

VIRGOE BUCKLAND

ELIAS PITTS SQUAREY

THOMAS CHATFEILD CLARKE

CHARLES STEPHENSON

HENRY CRAWTER

FRANCIS VIGERS

ROBERT COLLIER DRIVER

DANIEL WATNEY

EDWARD RYDE

THOMAS SMITH WOOLLEY

Associates of Council.

RICHARD BOXALL GRANTHAM

JOHN HORATIO LLOYD

RESOLVED—"That the thanks of the Meeting be given to Messrs. J. H. CLUTTON and F. W. CARDALL for their services as Scrutineers."

A vote of thanks to the Past President for his conduct in the Chair having been passed unanimously, the Meeting separated.

THE SIXTH
ANNUAL REPORT OF THE COUNCIL
TO THE
ANNUAL GENERAL MEETING, JUNE 1ST, 1874.

THE past year has been one of substantial progress in all that concerns the well-being of the Institution, and the Council congratulate the Members upon numerous indications of a future of well-founded prosperity.

The Institution may be said to have passed the most important epoch in the career of a Society of the kind,—the period when it feels its hold upon the general professional body in whose interests it exists, sufficiently strong, and its realized and prospective resources large enough, to warrant those who are responsible for its welfare in providing it with a home fitted both for its present and future requirements. It was not without anxiety that your Council decided upon the expensive alterations which have been recently effected in the premises of the Institution; but, believing that the Society had fairly passed through its probationary stage of existence, your Council were convinced that the time had arrived beyond which the changes rendered absolutely necessary by its rapid growth could be no longer deferred. The accommodation afforded by the old Rooms was felt to be quite inadequate; and, as alterations on an extensive scale were indispensable for present purposes, your Council decided that (as usual) the boldest and most thorough course was also the most prudent and economical, and resolved at once to take such steps (while confining the expenditure within prudent limits) as should render any further outlay unnecessary for some years to come.

The addition to the number of Members during the past year has far exceeded that of any previous session, and has been wholly due to an extended appreciation of the usefulness of the Society.

In the list of new Members and Associates will be found the names of several gentlemen who hold the first positions in their professions, and whose connection with us cannot fail to be of advantage to the Society.

The Council regret to announce the death during the past year of Mr. C. M. BIDWELL, of Ely, Mr. H. E. MARSH, of Cannon Street, and Mr. R. WATKINS, of Whitehall Place, obituary notices of whom will be found appended to this Report.

Since the date of the last Report 1 Honorary Member, 25 Members, 18 Associates, and 1 Student have joined the Institution, which now numbers 5 Honorary Members, 242 Members (one of whom has been transferred from the class of Associate), 89 Associates, and 6 Students, or 342 of all classes.

The name added to the first of these classes is that of His Grace the Duke of BEDFORD, who was this year elected, by acclamation, an Honorary Member of the Society.

As will be seen by the Balance Sheet, the financial position of the Society is, in all respects, satisfactory. It may be observed, however, that as only a comparatively small portion of the session just closed is covered by the published accounts for the year 1873, the greater part of the increased revenue derived from the subscriptions of new Members (most of whom have been elected since Christmas) does not appear in the yearly Balance Sheet, but is shown in the annexed Balance Sheet. Nevertheless, it will be seen that a marked increase in the receipts under this head has taken place, whilst the general expenditure has been maintained on the level of the previous year.

The Council took power to raise by Debenture Bonds a sum of £3,500. Of these Bonds 117 have been issued, representing a total of £2,925. This, it is hoped, will be sufficient, with available balances in hand, to pay off all liabilities with respect to the new buildings. The general result attained is, that by an expenditure of about £2,400 the Institution has been able in 6 years, out of its accumulated funds, to acquire à lease of 63 years of the house, No. 12, Great George Street (which, independent of the subsequent outlay, was worth, at least, £100 per annum profit rental), besides completely furnishing the Library, Lecture Hall, and other premises. The sum raised by the issue of the above 117 Debentures, has been applied solely to, and will entirely cover the expenses of, the building works and alterations.

In the last Report, the Council alluded to the temporary loss of rent resulting from the building operations.

The first-floor offices have now been let to substantial tenants for a term of seven years, at a rental of £170 per annum, the Council reserving to themselves the right to resume possession at any time for the purposes of the Institution.

A considerable revenue has accrued from the fees paid for the use of the Lecture Hall for arbitrations, and this item of receipt may be expected to increase considerably in future years.

The Council have the pleasure of announcing that two Debenture Bonds of £25 each have been most generously presented to the Institution by Mr. CLIFTON, towards the Building Fund, and one by Mr. R. G. CLUTTON, for the purchase of a clock for the Lecture Hall.

The Balance Sheet for the year ending December 31st, 1873, shows the following results:—

RECEIPTS.			EXPENDITURE.		
	£	s. d.		£	s. d.
Total Revenue	1,120	17 7	Total Payment out of		
Revenue Balance in hand,			Revenue,—		
January 1st, 1873	91	4 9½	Current Expenses	701	9 5
Entrance Fees and Life			Transferred to Capital	320	0 0
Composition carried to			Revenue Balance in hand,		
Capital Account	169	1 0	January 1st, 1874	190	12 11½
Debenture Bonds	1,250	0 0	Total Payment out of		
Transferred from Revenue	320	0 0	Capital,—Building, and		
Sale of Investment	399	8 6	Furniture	2,350	16 0
Cash withdrawn from De-			Debentures paid off	50	0 0
posit	500	0 0	Capital Balance in hand,		
Donation to Building Fund	50	0 0	January 1st, 1874	443	1 2
Capital Balance in hand,					
January 1st, 1873	155	7 8			
	<u>£4,055</u>	<u>19 6½</u>		<u>£4,055</u>	<u>19 6½</u>

In addition to the above cash balances, Stock to the amount of £168 18s. Consols, and £407 1s. 9d. New Three per Cents. (of which £100 is invested on the Library account), stood to the credit of the Trustees of the Institution on December 31st, 1873.

A summary of the receipts and expenditure for the present year, up to this date, is as follows:—

RECEIPTS.			EXPENDITURE.		
	£	s. d.		£	s. d.
Total Revenue	1,028	10 10	Total Payment out of		
Revenue Balance in			Revenue, Current		
hand, January			Expenses	524	19 6
1st, 1874	190	12 11½	Interest on Mort-		
Entrance Fees, and			gaged Debentures	93	12 7
Two Life Compo-			Revenue Balance in		
sitions, carried to			hand, January 1st,		
Capital Account	183	15 0	1874	600	11 8½
Capital Balance in			Payments out of		
hand, January 1st,			Capital, Furniture,		
1874	443	1 2	&c.	145	9 11
			Capital Balance in		
			hand, January 1st,		
			1874	481	6 3
	<u>£1,845</u>	<u>19 11½</u>		<u>£1,845</u>	<u>19 11½</u>

In addition to the above cash balances, the same amount of Stock in Consols and New Three per Cents. remain to the credit of the Trustees, at the date of this Report, as on December 31st, 1873.

The Library balance in hand is £65 1s. 8½d., in addition to the £100 invested in New Three per Cents., as above-mentioned.

The total liabilities on current expenses amount to about £160, of which £125 is for rent.

A liability estimated at about £725 remains in respect of the new buildings. It will be seen that a cash balance sufficient to cover this is now in the hands of the Treasurer, and ready to be paid over so soon as the Contractor's account can be adjusted.

There is now a considerable balance in hand in the Library account, available for the purchase of books, but the Council, whilst fully sensible of the liberality displayed by many of the Members in contributing towards the development of this most useful and important feature of the Institution, feel that a more general response on the part of the Members to their appeal for aid in this direction is much needed. Many of the new Members and some of the older ones have, as yet, failed to fulfil the obligation, into which they entered at the time of their election, to make a donation in money or in kind to the Library.

The unsatisfactory condition of the street entrance to the Institution has engaged the attention of the Council, and it has been determined to effect considerable improvement in it, during the recess, by the erection of a porch, and by widening the entrance. Mr. R. C. DRIVER, with a liberality which will be highly appreciated by the Members, has undertaken to bear the cost of the contemplated alterations, and a Committee has been appointed to advise and report upon their nature and extent.

The Council have to record as among the most gratifying incidents of the session, the generous donation, by His Grace the Duke of BEDFORD, of a series of most rare and valuable works to the Topographical collection of the Library. Those who have had experience of the great cost of many of the scarcer County Histories will be able to estimate the magnitude of the presentation.

The Council were gratified to see that so many Members and their friends were able to respond to their invitation to the *conversazione*, held in November last, to inaugurate the opening of the new rooms, and feel that much of the success of the gathering was due to the kindness and liberality of

those who lent works of art and objects of interest for exhibition on the occasion. Besides to the Members themselves who were liberal contributors, the thanks of the Council are felt to be specially due to Mr. J. E. GARDINER, who exhibited a portion of his fine collection of views illustrative of the topography of London and Westminster; to Mr. J. ANDERSON ROSE, who contributed a large number of historical portraits; to Mr. J. E. PRICE, who sent many examples of Roman pottery and Samian ware, and to Mr. GEORGE LAMBERT for the loan of many valuable specimens of antique plate and jewellery.

As was anticipated, the Ordinary General Meetings have been much more fully attended since the opening of the new rooms, and the character of the discussions has been in all respects equal to that of previous sessions. Fewer Papers than usual have been read, but this has been owing to the interest excited by several of them, necessitating, in more than one instance, an adjournment of the debate over two or more nights.

While thanking those who have freely given the results of their experience on these occasions, the Council appeal to those Members who rarely attend and whose assistance would be most valuable and most welcome, to contribute their aid in this direction.

Twelve Ordinary General Meetings have been held during the session, and the following Papers have been read and discussed:—

The Opening Address, by E. N. CLIFTON, President.

Agricultural Geology (Southern Division), by E. P. SQUAREY.

The Lands Clauses Acts, with some Suggestions for their Amendment, by F. A. PHILBRICK.

The Self-Sown Oak Woods of Sussex, by R. W. CLUTTON.

Timber, by D. WATNEY.

Coprolites, by C. BIDWELL.

Agricultural Geology (Northern Division), by E. J. SMITH.

In conclusion, your Council desire to express their gratification with the manner in which their labour has been supplemented by the Members, and their full confidence in the successful future of the Institution.

Dr.

STATEMENT OF RECEIPTS AND EXPENDITURE

RECEIPTS.			REVENUE		
	£	s. d.	£	s. d.	£
1873.					
199 Members' Subscriptions for 1873, at £3 3s. -	626	17 0			
2 " " " in advance for 1874 -	6	6 0			
3 New Members " -	9	9 0			
1 Member's Arrear for 1872 -	3	8 0			
			645	15 0	
68 Associates' Subscriptions for 1873, at £2 2s. -	142	16 0			
1 " " Arrear for 1871 -	2	2 0			
3 " " Arrears for 1872 -	6	6 0			
			151	4 0	
5 Students' Subscriptions for 1873, at £1 1s. -			5	5 0	
Rent of Offices and Hire of Arbitration Room -					802 4
Dividends -					276 1
Cash in hands of Treasurer and Secretary, December 31st, 1872 -					42 11
					91 4

£1,212 2

CAPITAL					
	£	s. d.	£	s. d.	£
19 New Members' Entrance Fees for 1873, at £5 5s. -	99	15 0			
3 Members' Entrance Fees, Arrears for 1872, at £5 5s. -	15	15 0			
			115	10 0	
6 New Associates' Entrance Fees for 1873, at £3 3s. -	18	18 0			
1 Associate's Entrance Fee, Arrear for 1872, at £3 3s. -	3	8 0			
			22	1 0	
1 Member's Life Composition -			31	10 0	
					169 1
By Sale of New Three per Cents. -	400	0 0			
Deduct Power of Attorney -	0	11 6			
					399 8
Cash transferred from Revenue, for Building -					320 0
Cash withdrawn from Deposit, London and Westminster Bank -					500 0
By 50 Debenture Bonds of £25 each -					1,250 0
By Donation to Building Fund -					50 0
Balance in hand of Treasurer, December 31st, 1872 -					155 7

£2,843 17

LIBRARY					
	£	s.			
Donations, 1873 -					39 18
Dividends -					6 6
Balance in hands of Treasurer, December 31st, 1872 -					55 9

£101 14

SUM					
	£	s.			
Revenue Account -					1,212 2
Capital Account -					2,843 17
Library Account -					101 14

£4,157 14

ASSETS			AN		
	£	s.			
Cash in hands of Treasurer and Secretary -					712 15
Value of Furniture and Books -					900 0
Invested in New Three per Cents. and Consols -					457 10
" " " " Library -					100 0
Subscriptions and Entrance Fees, due but unpaid at date, estimated to produce -					42 0
Value of Premises, 12, Great George Street -					5,000 0

£7,212 5

THE YEAR ENDING DECEMBER 31st, 1873.

Cr.

COUNT.

EXPENDITURE.

	£	s.	d.	£	s.	d.
1873.						
ance	120	16	8			
and Taxes	3	10	0			
Light, and Water	78	7	6			
	89	16	2			
st on Loans				242	10	4
s				21	13	0
ery, Postage and Receipt Stamps, Books of Account, &c.				9	7	10
ations and Parliamentary Papers				14	11	9
s and Wages				4	10	0
d Coffee at Meetings				270	1	5
old Effects, &c.				8	18	10
ation of Transactions—Printing	112	17	0	6	18	0
" Covers and Binding	11	7	2			
" Reporting	23	2	0			
	147	6	2			
ale of ditto	29	9	5			
				117	16	9
l Printing				10	6	6
ferred to Capital Account for Building				820	0	0
				£1,021	9	5
hands of Secretary	20	0	0			
" Treasurer	170	12	11½			
				190	12	11½
				£1,212	2	4½

COUNT.

	£	s.	d.
nt on Account of New Buildings and Alterations	2,050	0	0
" Furniture, Fixtures, and Gas Fittings	800	16	0
ebentures of £25 each (E. N. Clifton), paid off	50	0	0
e in hands of Treasurer	448	1	2
	£2,848	17	2

COUNT.

	£	s.	d.
se of Books and Maps	22	12	9
e in hands of Treasurer	79	1	8½
	£101	14	5½

RY.

	£	s.	d.
	1,021	9	5
	2,400	16	0
	22	12	9
e in hands of Treasurer and Secretary	712	15	10
	£4,157	14	0

ABILITIES.

	£	s.	d.
Quarters' Rent due, Christmas 1873	187	10	0
ousekeeping, Printing, and various Accounts	82	10	0
lding Account	800	0	0
ure and Fittings	95	0	0
t due on Debentures	18	6	6
ebentures, at £25 each	2,875	0	0
	£3,158	19	4

Examined with the Books and Vouchers, and found to be correct,
May 21st, 1874.

ROBERT VIGERS,
ARTHUR GARRARD, } Auditors.

£7,212 5 10

APPENDIX TO VOL. VI.

Obituary.

CHARLES MURIEL BIDWELL (Member) was born at Ely, on the 27th of October, 1814. His father (the late Mr. CHARLES BIDWELL, of that place) was thrown out of his carriage and killed, leaving the subject of this memoir at the age of 15, the eldest of eight children.

Mr. C. M. BIDWELL was articled to Mr. WILLIAM MEDLAND, of St. Neots, and afterwards passed several years in a London office in the study of his profession.

In the year 1840 (in conjunction with Mr. J. B. DENTON, with whom he was associated in business matters), he undertook the first-class tithe survey of the city and parishes of Ely, and also carried out several large works in connection with Mr. C. F. ADAMS.

In early life, Mr. BIDWELL was largely engaged in the extensive drainage works of the Cambridgeshire district, the Middle Level, the South Level, and other undertakings. Also in matters connected with tithe commutation and inclosures, and, at the time of his death, had in hand a large inclosure of 1,600 acres at Stamford, which his son and successor, Mr. CHARLES BIDWELL, who is a Member of this Institution, is now completing.

Mr. C. M. BIDWELL acted as Land Valuer to the Great Northern Railway Company, from their earliest undertakings, and bought a large portion of the original line, and, at the time of his death, was engaged in purchasing the land for that Company for Railways in Derbyshire and Staffordshire and other works.

He was concerned as Agent for most of the colleges in Cambridge, acting in that capacity for Trinity, King's, Queen's, St. Peter's, Gonville and Caius, Corpus Christi,

Jesus, St. Catherine's, Pembroke, and Emmanuel Colleges. He was also receiver for several large land-owners in his district, and enjoyed a large business in the sale and purchase of estates.

Until within a short period of his death he had enjoyed the most robust health, but it had become somewhat impaired of late, owing to a severe fall from his horse, which happened in November 1872; but his friends were far from apprehending that consequences of so serious a nature—and which it is believed were the inducing causes of his death—would follow from the accident.

The last time that Mr. BIDWELL was present at the Institution was at the Meeting of April 27th, when his son, Mr. C. BIDWELL, read a Paper before the Institution. A few days later, an insidious disease, the existence of which had not even been suspected, suddenly developed itself, and to which he succumbed on the 30th of May, in the 60th year of his age.

He was among the first thirty Members who joined the Institution, and from whom the first Council was chosen, and, on all occasions, evinced the most lively interest in its welfare, and the strongest confidence in its future.

As a man of business, he was a remarkable illustration of success, achieved by unaided energy and ability, and will long be remembered in his native place as one whose genial disposition and whose active sympathy with local objects and interests of every description secured him the esteem and respect of all who knew him. Nor will he be soon forgotten among the Members of his profession, among whom he was held in high estimation for high-minded and independent dealing, and unswerving integrity in all the relations of his professional life.

HENRY EDMUND MARSH (Member) was born at Morden College, Blackheath (of which Institution his

father, the late Rev. W. Marsh, was Chaplain), on the 5th of December, 1819.

He commenced business about the year 1843, in partnership with Mr. Francis Fuller (Member of this Institution). Upon the dissolution of that partnership Mr. Marsh continued his practice at Charlotte Row, Mansion House, until the year 1866, when the premises being required for the recent street improvements he removed to No. 54, Cannon Street.

For many years previous to his death Mr. Marsh carried on a lucrative business, and was specially well known in connection with the sale of Reversionary and Life Interests, in Land and other property, Life Policies and Annuities.

In addition to his active professional pursuits Mr. Marsh discharged the duties of Director in several public Companies, among others the Law Union Fire and Life Office, with which he was connected from its establishment.

Mr. Marsh died of heart disease at Bexley, in Kent, where he resided and possessed a valuable estate, on the 4th of October, 1873, in the 54th year of his age.

ROBERT WATKINS (Member), of the firm of SMITH & WATKINS, of 16, Whitehall Place, was the only son of Mr. SAMUEL WATKINS, the Resident Agent of His Grace the Duke of NORFOLK, at Worksop.

Mr. WATKINS was articled to Mr. ALEXANDER, of Doncaster, in the year 1836, and practised for some years on his own account, and afterwards assisted Mr. E. J. SMITH (also a pupil of Mr. ALEXANDER), until he went into the partnership in the year 1864.

His comparatively early death was undoubtedly hastened by his devotedness to his profession, in which few Surveyors had a wider experience. Mr. WATKINS died on the 18th day of January, 1874, in the 54th year of his age.

LIST OF DONATIONS AND CONTRIBUTIONS UP TO JUNE 1ST, 1874.

DONATIONS OF BOOKS, MAPS, &c.

DONORS.	TITLE OF WORK.
<i>Architect</i> , Editor of the	"The Architect," 1874.
Argyll, His Grace the Duke of	} An Account of the Great Trigonometrical Survey of India.
Bath and West of England Agricultural Society	
	{ The Journal of the Bath and West of England Agricultural Society, Vols. I., II., III., IV., and V.
	"History of Cornwall." 4 vols. By D. Gilbert.
	"History of Durham." 4 vols. By R. Surtees.
	"History of Gloucestershire." 1 vol. By R. Atkyn.
	"History of Hampshire." 3 vols. By R. Warner.
	"History of Leeds." 2 vols. By R. Thoresby.
Bedford, His Grace the Duke of	"History of Northamptonshire." 3 vols. By J. Bridges.
	"History of Nottinghamshire." 1 vol. By R. Thoroton.
	"History of Shropshire." 12 vols. By R. W. Eyton.
	"History of Suffolk." 2 vols. By A. Suckling.
	"History of Sussex." 2 vols. By J. Dallaway.
Bellamy, C. J.	{ "Tables for 'Taking out Quantities.'" By C. J. Bellamy.
Bonny, J. R.	{ "The English Atlas." By Moses Pitt. 4 vols. folio (A.D. 1680).
<i>Builder</i> , Editor of the	"The Builder," 1874.
<i>Building News</i> , Editor of the	{ "The Building News," 1874.
Crawter, H.	{ "History of Essex." 2 vols. 1816. By P. Morant.
<i>Estate Exchange</i> , The	{ "Index to the Estate Exchange Registers." 1874.
<i>Farmers' Club</i> , The	"Journal of the Farmers' Club." 1874.
Gouthwaite, R.	{ "Analysis of Gothic Architecture." By R. & J. A. Brandon.

- Grantham, R. B. . . . { "Report (1873) on the Floods in Somersetshire." By R. B. Grantham.
- Haywood, W. . . . { "Report (1874) to the Commissioners of Sewers of the City of London on the Accidents to Horses on Carriageway Pavements." By W. Haywood.
"Map of the City of London Sewers." By W. Haywood.
- Humbert, C. F. . . . { "The Quarterly Journal of the Geological Society." 15 vols.
"History and Antiquities of Croydon." By D. W. Garrow.
"Annals of the Church of St. Mary Overy." By W. Taylor.
"History of St. Saviour's Parish." By W. Taylor.
- Institution of Civil Engineers { "Minutes and Proceedings." Vols. XXXV. and XXXVI. Session 1872-73.
- Institution of Mechanical Engineers { "Proceedings." Session 1873-74.
- Institute of Mining Engineers { "Proceedings." Vols. XXI. and XXII.
- Johnson, M. H. . . . { "The Nature and Formation of Flint and Allied Bodies." By M. H. Johnson.
- Oakley, C. "Sylva Britannica." By J. G. Strutt.
- Ridley, G. { "The Atmosphere." By Camille Flammarion.
"The Practical Magazine." Vols. I. and II. 1873.
- Robson, E. R. "School Architecture." By E. R. Robson.
- Royal Agricultural Society { "Journal of the Royal Agricultural Society." Vol. IX., Part II. 1873.
Vol. X., Part I.
- Sturge, W. { "Essay on the Farming of Somersetshire." By W. Sturge, and T. D. Acland.

CONTRIBUTIONS IN MONEY TO LIBRARY FUND.

	£	s.	d.
Cheffins, C. R.	5	5	0
Drew, J.	5	5	0
Huskinson, T.	10	10	0
King, W.	5	5	0
Nisbet, R. P.	3	3	0
Noble, J.	5	5	0
Prickett, W. B.	3	3	0
Slater, G.	3	3	0

INSTITUTION OF SURVEYORS.

List of Members, June 1st, 1874, with Council for Session 1874-75.

Honorary Members.

BEDFORD, HIS GRACE THE DUKE OF	81 & 82, Eaton Square, S.W.
GORE, CHARLES ALEXANDER, The	
HONORABLE	Office of Woods, &c., 1, Whitehall Place.
HOWARD, JAMES KENNETH, The	
HONORABLE	Office of Woods, &c., 1, Whitehall Place.
LEACH, GEORGE ARCHIBALD, }	Tithe and Inclosure Commission Office, St.
LIEUT.-COLONEL }	James's Square.
RIDLEY, GEORGE }	Tithe and Inclosure Commission Office, St.
	James's Square.

Members.

ABBOTT, THOMAS	22, Savile Row, W.
ADAMS, CHARLES FREDERICK	Barkway, Herts.
APPERLEY, WILLIAM HAVARD	Hereford.
ARDING, CHARLES BENNETT	23, Bedford Row, W.C.
ARNOLD, GEORGE	Dolton, North Devon.
BARRY, CHARLES	1, Westminster Chambers, Victoria Street, S.W.
BEADEL, FREDERICK	25, Gresham Street, E.C.
BEADEL, WILLIAM JAMES	25, Gresham Street, E.C.
<i>(Member of Council)</i>	
BEAUMONT, GEORGE, JUN.	East Bridgford, near Nottingham.
BEESTON, FREDERICK	16, Walbrook, E.C.
BEWICK, THOMAS JOHN	4, Broad Sanctuary, S.W.
BIDWELL, CHARLES	Ely, Cambridgeshire.
BIDWELL, CHARLES MURIEL	Ely, Cambridgeshire (deceased).
BINNIE, THOMAS	152, West George Street, Glasgow.
BIRD, JAMES BINFIELD	West Cowes, Isle of Wight.
BLACKADDER, ROBERT	Dundee, Forfarshire.
BLOUNT, WILLIAM	Orchehill House, Gerard's Cross, Bucks.
BOLAM, CHARLES GODFREY	Savernake Forest, Wiltshire.
BOLAM, HARRY GEORGE	Ingestre, Stafford.
BOND, ERASMUS	23, Bedford Row, W.C.
BONNY, JAMES RIPPOTH	43, Camden Road, N.W.
BOWLER, WILLIAM ANTHONY	Craven Chambers, Craven Street, W.C.
BRADLEY, CHRISTOPHER LONSDALE	Richmond, Yorkshire, and 75, Victoria Street, S.W.
BRAVENDER, JOHN	Cirencester, Gloucestershire.
BROADERIDGE, JAMES	1, Stanhope Terrace, Kensington, W.

MEMBERS.

BROWN, DANIEL JOHNSON	34, Great George Street, S.W.
BROWN, GEORGE	Roborough House, Barnstaple, Devonshire.
BROWN, JOHN	Rose Hill, Chesterfield.
BROWN, THOMAS FORSTER	Guildhall Chambers, Cardiff.
BROWN, WILLIAM	Tring, Herts.
BRYANT, ARTHUR JOHN	3, Old Palace Yard, Westminster, S.W.
BUCHAN, THOMAS	24, Bank Street, Dundee.
BUCK, ALBERT	Worcester.
BUCKLAND, FRANK BOWREY	Windsor.
BUCKLAND, VIRGOE	66, Cannon Street, E.C.
<i>(Member of Council)</i>	
BURNELL, EDWARD HENRY	32, Bedford Row, W.C.
BUZZARD, ALFRED LINDSEY	Surrey Chambers, 172, Strand, W.C.
CADLE, CLEMENT	{ Clarence Street, Gloucester, and 52, Chancery Lane, W.C.
CASTLE, HENRY JAMES, SEN.	5, Chancery Lane, W.C.
CASTLE, WILLIAM HENRY BALDWIN	5, Chancery Lane, W.C.
CASTLE, ROBERT	Merton Street, Oxford.
CATES, ARTHUR	7, Whitehall Yard, S.W.
CHANCELLOR, FREDERICK	Chelmsford, Essex, and 8, Finsbury Circus, E.C.
CHAPMAN, GEORGE	14, Cockspur Street, S.W.
CHAPMAN, THOMAS	14, Cockspur Street, S.W.
CHEFFINS, CHARLES RICHARD	23, Abingdon Street, S.W.
CHINNOCK, FREDERICK GEORGE	11, Waterloo Place, S.W.
CLARK, FREDERICK JAMES	5, Lancaster Place, W.C.
CLARKE, THOMAS CHATFIELD	63, Bishopsgate Street Within, E.C.
<i>(Member of Council)</i>	
CLIFTON, EDWARD NORTON	7, East India Avenue, E.C.
<i>(Past President)</i>	
CLUTTON, HENRY	9, Whitehall Place, S.W.
CLUTTON, JOHN	9, Whitehall Place, S.W.
<i>(Past President)</i>	
CLUTTON, RALPH	9, Whitehall Place.
CLUTTON, ROBERT	Hartwood, Reigate, Surrey.
CLUTTON, ROBERT GEORGE	9, Whitehall Place, S.W.
CLUTTON, WILLIAM JAMES	The Mount, York.
COBB, ROBERT LAKE	Higham, Kent.
COLLIER, JOHN	Salters' Hall, St. Swithin's Lane, E.C.
COLLINS, HENRY HYMAN	5, Queen Street, E.C.
COMELY, JOHN GILL	Winchester, Hants.
COOKE, CHARLES HENRY	11, John Street, Bedford Row, W.C.
COUCHMAN, CHARLES	6, Waterloo Street, Birmingham.
CRAWTER, HENRY	5, Bedford Row, W.C.
<i>(Member of Council)</i>	
CRAWTER, JOHN	Cheshunt, Herts.
CRICKMAY, GEORGE RACKSTROW	St. Thomas Street, Weymouth.
CRONK, EDWIN EVANS	Sevenoaks, Kent.

MEMBERS.

CROSS, WILLIAM STEPHENS	53, Charing Cross, S.W.
CULSHAW, WILLIAM	Rumford Court, Liverpool.
CURREY, HENRY	37, Norfolk Street, W.C.
DAVID, EDWARD	Llandaff, Glamorganshire.
DAVIDS, CHARLES HENRY	Banbury, Oxfordshire.
DAVIES, JOHN MORGAN	Froodvale, Llandilo, Carmarthenshire.
DENT, JOHN	34, Great James Street, W.C.
DENTON, JOHN BAILEY	22, Whitehall Place, S.W.
DOWN, HENRY	Basingstoke, Hants.
DREW, JOHN	{ 9, Queen Street, Exeter, and Powderham Castle, near Exeter.
DREW, HENRY	Exeter.
DRIVER, ROBERT COLLIER (Member of Council)	4, Whitehall, S.W.
DUNCH, CHARLES	{ District Board Offices, White House, Commercial Road, E.
DUNLOP, ALEXANDER MILNE	3, Old Palace Yard, Westminster, S.W.
DURRANT, EDWIN ELMER	King's Lynn, Norfolk.
DYMOND, FRANCIS WILLIAMS	Exeter.
EASTON, WILLIAM	6, Hammet Street, Taunton, Somersetshire.
EILOART, FERDINAND GOZNA	40, Chancery Lane, W.C.
ELLIS, JOHN	Artington, Guildford, Surrey.
EMMANUEL, BARROW	2, Finsbury Circus, E.C.
EVE, WILLIAM	10, Union Court, Old Broad Street, E.C.
EVES, GEORGE	Uxbridge, Middlesex.
FELTON, GEORGE	Llandudno, Carnarvon.
FIELD, FRANCIS HAYWARD	Merton Street, Oxford.
FISHER, ROWLAND GEORGE	17, Great George Street, Westminster, S.W.
FOSTER, CHARLES ROLLS	54, Pall Mall, S.W.
FOWLER, WILLIAM	23, Waterloo Street, Birmingham.
FOX, FREDERICK FRANCIS	Melbourne, near Derby.
FULLER, FRANCIS	3, Whitehall Gardens, S.W.
GALSWORTHY, FREDERICK THOMAS	11, Waterloo Place, S.W.
GARDINER, WILLIAM JAMES	110, Great Russell Street, W.C.
GIRDWOOD, JAMES	49, Pall Mall, S.W.
GOUTHWAITE, RICHARD	Lumby, near South Milford, Yorkshire.
HADDOCK, ROLAND	21, High Street, Croydon, Surrey.
HALL, RICHARD (Past President)	37, Great George Street, S.W.
HALL, RICHARD, JUN.	37, Great George Street, S.W.
HALL, ROBERT WRIGHT	37, Great George Street, S.W.
HART, WILLIAM FREDERICK	16A, King's Road, Bedford Row, W.C.
HARVEY, JOHN	6, Victoria Place, Haverfordwest, Pembrokeshire.

MEMBERS.

HARVEY, RICHARD HART . . .	6, Victoria Place, Haverfordwest, Pembrokeshire.
HASLAM, DRYLAND . . .	17, Friar Street, Reading.
HAYWOOD, WILLIAM . . .	Guildhall, London, E.C.
HEDLEY, THOMAS FENWICK . .	Sunderland.
HILLIARD, GEORGE BRIDGE . .	Chelmsford, Essex.
HIPPISLEY, EDWIN . . .	Chamberlain Street, Wells, Somersetshire.
HORNBLLOWER, JOHN LEWIS . .	16, Montpelier Road, Brighton.
HORSEY, THOMAS . . .	11, Billiter Square, E.C.
HORSFALL, RICHARD . . .	Halifax, Yorkshire.
HORWOOD, JAMES . . .	10, Paternoster Row, E.C.
HUDSON, WILLIAM . . .	19, Bennet's Hill, E.C.
HUMBERT, CHARLES F. . .	Watford, Herts.
HUMPHREYS, CHARLES . . .	61, Leadenhall Street, E.C.
HUNT, HENRY ARTHUR, C.B. . .	45, Parliament Street, Westminster, S.W.
HUNT, HENRY ARTHUR, JUN. . .	3, Victoria Street, Westminster, S.W.
HUNT, JOSIAH . . .	11, Park Street, Westminster, S.W.
HUSKINSON, THOMAS . . .	Epperstone, Southwell, Notts.
(President)	
HUSKINSON, WILLIAM LAMBE . .	The Manor House, Epperstone, Southwell, Notts
HUSSEY, GEORGE HENRY . . .	The Green, High Wycombe, Bucks.
I'ANSON, EDWARD . . .	7A, Laurence Pountney Hill, E.C.
INNES, JAMES . . .	Wroxton, Banbury, Oxfordshire.
JACKSON, FREDERICK . . .	Nottingham.
JONAS, JOHN CARTER . . .	27, Market Hill, Cambridge.
JONES, HENRY PARR . . .	Portway House, Warminster.
KING, WILLIAM DAVID . . .	1, Grand Parade, Portsmouth.
KNOLLYS, JAMES EDWARD . . .	Fitzhead Court, Taunton, Somerset.
KNOWLES, WILLIAM . . .	Albion Chambers, King Street, Gloucester.
LAMBERT, WILLIAM . . .	4, New Basinghall Street, E.C.
LAURANCE, JOHN, JUN. . .	Warmington, near Oundle, Northants.
LAVENDER, JOSEPH . . .	26, Bedford Row, W.C.
LEE, CHARLES . . .	3, Whitehall Place, S.W.
LEE, FREDERICK . . .	{ 6, Great College Street, Westminster, S.W., and Queen's Road, Kingston Hill.
LEES, JOHN . . .	Reigate, Surrey.
LOVEJOY, WILLIAM . . .	55, Chancery Lane, W.C.
LYE, JOHN GAUNT . . .	8, Lancaster Place, W.C.
MACAULAY, COLIN ALEXANDER . .	Leicester.
MANN, CHARLES JOHN . . .	21, Parliament Street, S.W.
MARR, JAMES . . .	8, Adam Street, Adelphi, W.C.
MARTIN, JAMES . . .	Wainfleet, Boston, Lincolnshire.
MARTIN, SAMUEL DICKINSON . .	2, Beech Grove, Harrogate.

MEMBERS.

MATHEWS, JEREMIAH	15, Waterloo Street, Birmingham.
(<i>Vice-President</i>)	
MATHEWS, WILLIAM, JUN.	15, Waterloo Street, Birmingham.
MENZIES, WILLIAM	Parkside, Staines, Middlesex.
MURTON, WILLIAM	Tunstall, Sittingbourne, Kent.
NAYLOR, ARTHUR MILLINGTON	3, Old Palace Yard, Westminster, S.W.
NEALE, CHARLES JAMES	High Oakham, Mansfield, Notts.
NEWMAN, FRANCIS	Ryde, Isle of Wight.
NISBET, RALPH P.	Clarendon Chambers, 26 & 27 Villiers St., Strand.
NOBLE, JOHN	Woodhall, Herts.
NORMAN, WILLIAM	8, Spring Gardens, S.W.
NORTH, GEORGE	22, Whitehall Place, S.W.
NOTLEY, RICHARD ALBERT	80, Cornhill, E.C.
OAKLEY, JOHN	10, Waterloo Place, S.W.
(<i>Vice-President</i>)	
OAKLEY, CHRISTOPHER	10, Waterloo Place, S.W.
OWEN, THOMAS RULE	High Street, Haverfordwest, Pembrokeshire.
PARSONS, HENRY	Haslebury Plucknett, Crewkerne, Somerset.
PAXTON, JONAS	Bicester.
PENFOLD, JOHN WORNHAM	17, Parliament Street, Westminster, S.W.
(<i>Honorary Secretary</i>)	
PINK, CHARLES	Winchester.
POUNDLEY, JOHN EDWARD	Black Hall, Kerry, Montgomeryshire.
PRICKETT, GEORGE	62, Chancery Lane, W.C.
PRICKETT, WALTER BELLSON	62, Chancery Lane, W.C.
PYNE, JOHN	Canford Manor, Wimborne, Dorset.
RAWLENCE, GEORGE	Salisbury, Wilts.
RAWLENCE, JAMES	Salisbury, Wilts.
RAYNBIRD, HUGH EDWARD	Basingstoke, Hants.
RICKMAN, THOMAS MILLER	8, Montague Street, Russell Square, W.C.
RIGDEN, RICHARD HENRY	The Close, Salisbury, Wilts.
ROBERTS, RICHARD	25, Laurence Pountney Lane, E.C.
ROBINS, EDWARD COOKWORTHY	16, Southampton Street, Strand, W.C.
ROBSON, EDWARD ROBERT	{ 20, Great George Street, Westminster; and 6, St. Germain's Place, Blackheath, S.E.
ROSSER, WILLIAM	Llanelly, Carmarthen.
RUSHWORTH, EDMUND	22, Savile Row, W.
RYDE, EDWARD	17, Parliament Street, Westminster, S.W.
(<i>Member of Council</i>)	
SAUNDERS, CECIL GEORGE	21, Parliament Street, S.W.
SAUNDERS, EDWARD	6, Bishopsgate Street Without, E.C.
SAVILL, ALFRED	3, St. Helen's Place, E.C.; and Chigwell, Essex.
SCARTH, WILLIAM	Raby Castle, Darlington.
SCOTT, THOMAS COLVILLE	19, King's Arms Yard, E.C.

MEMBERS.

SEDGWICK, ALFRED OTHWAITE	Watford, Herts.
SHOPPEE, CHARLES JOHN	61, Doughty Street, W.C.
(Member of Council)	
SLATER, GEORGE	Canterbury.
SMELLIE, THOMAS DAVIES	209, St. Vincent Street, Glasgow.
SMITH, CHARLES BOVILL	Wickham, Hants.
SMITH, CHARLES JOHN	10, Waterloo Place, S.W.
SMITH, EDMUND JAMES	16, Whitehall Place, S.W.
(Vice-President)	
SMITH, FREDERICK	Blackburn.
SMITH, THOMAS TAYLER	33, Bloomsbury Square, W.C.
SNOOKE, WILLIAM	6, Duke Street, London Bridge, S.E.
SOUTHWELL, CHARLES JOSIAH	9, Whitehall Place, S.W.
SPACKMAN, HENRY	6, Terrace Walks, Bath.
SPOONER, LUCIUS HENRY	11, Park Street, S.W.
SQUAREY, ELIAS PITTS	{ 22, Great George Street, S.W.: and The Moot, Downton, Salisbury.
(Member of Council)	
ST. QUINTIN, PERRY	27, Royal Exchange, E.C.
STANLEY, HENRY	Bury St. Edmund's, Suffolk.
STATTER, THOMAS	Standhill, Whitefield, Manchester.
STEPHENSON, CHARLES	45, Parliament Street, Westminster, S.W.
(Member of Council)	
STEWART, HERBERT THOMAS	3, Victoria Street, S.W.
STURGE, ROBERT FOWLER	34, Corn Street, Bristol.
STURGE, WILLIAM	34, Corn Street, Bristol.
(Vice-President)	
SWORDER, GEORGE EDWARD	Bishop's Stortford, Herts.
THOMAS, JOHN EDMUND	Hay, Breconshire.
THOMAS, JOSIAH	Athenæum Chambers, Nicholas Street, Bristol.
THYNNE, EDWARD LEWIS	11, Great George Street, S.W.
THYNNE, FREDERICK GEORGE	11, Great George Street, S.W.
TONER, JOHN	4, Gray's Inn Square, W.C.
TRIST, GEORGE	62, Old Broad Street, E.C.
TROLLOPE, CHARLES BROWN	2, Upper Charles Street, Westminster, S.W.
TRUMPER, RICHARD	23, Lincoln's Inn Fields, W.C.
TUCKETT, PHILIP DEBELL	10A, Old Broad Street, E.C.
TURNER, WILLIAM	Ipswich, Suffolk.
VIGERS, EDWARD, JUN.	15, Parliament Street, Westminster, S.W.
VIGERS, FRANCIS	4, Frederick's Place, E.C.
(Member of Council)	
VIGERS, ROBERT	4, Frederick's Place, E.C.
VULLIAMY, GEORGE	{ Metropolitan Board of Works, Spring Gardens, S.W.
WALLIN, JOHN	155, Leadenhall Street, E.C.
WARING, THOMAS	21, Queen Street, Cardiff.

MEMBERS.—ASSOCIATES.

WATKINS, ROBERT	16, Whitehall Place, S.W. (deceased)
WATNEY, DANIEL	62, Old Broad Street, E.C.
<i>(Member of Council)</i>	
WEALL, JOHN, JUN. . . .	Rugby House, Pinner, Middlesex.
WEBB, GEORGE	Tunstall, Sittingbourne, Kent.
WESTBURY, GILES	Andover, Hants, & 44, Lincoln's Inn Fields, W.C.
WHEELER, THOMAS	46, Eastcheap, E.C.
WHICHCORD, JOHN	12, Queen Victoria Street, Mansion House.
WIDNELL, FREDERICK GRAINGER	2, Upper Charles Street, Westminster, S.W.
WILLIAMS, GEORGE BARNES . .	Frederick's Place, E.C.
WILLIAMS, STEPHEN WILLIAM .	Rhayader, Radnorshire.
WILLMOT, FRANCIS	33, Waterloo Street, Birmingham.
WIMBLE, JOHN	10, Queen Victoria Street, Mansion House, E.C.
WITHALL, RICHARD AUGUSTUS .	4, Westminster Chambers, Victoria Street, S.W.
WOOD, FREDERICK	Albert House, Rugby, Warwickshire.
WOOD, WILLIAM BRYAN . . .	Chippenham, Wilts.
WOODCOCK, RICHARD	20, Darlington Street, Wolverhampton.
WOODHOUSE, JOHN THOMAS . .	Midland Road, Derby.
WOOLLEY, THOMAS SMITH . .	South Collingham, Newark, Notts.
<i>(Member of Council).</i>	
WRIGHT, WILLIAM EDWARD . .	King's Lynn, Norfolk.
WRIGHT, WILLIAM	Wollaton, Nottinghamshire.

Associates.

BADCOCK, PHILIP	{ 9, Whitehall Place; and 4, Aldridge Road, West- bourne Park, W.
BARRY, JOHN WOLFE	
BEAUCHAMP, CHARLES DAVIE . .	9, Duke Street, Westminster, S.W.
BIDDER, GEORGE PARKER, JUN.,	} 9, Whitehall Place, S.W.
Q.C.	
BRAMWELL, FREDERICK JOSEPH .	3, Paper Buildings, Temple.
BUTLER, ARTHUR	37, Great George Street, Westminster, S.W.
	7, Staple Inn, W.C.
CARDALL, FREDERIC WILLIAM . .	9, Whitehall Place, S.W.
CARLISLE, WILLIAM THOMAS . .	8, New Square, Lincoln's Inn, W.C.
CARRITT, ERNEST	16, Basinghall Street, E.C.
CASTLE, EDWARD JAMES	4, Brick Court, Temple.
CATLING, ROBERT CHARLES . .	Needham Hall, Elm, Cambridgeshire.
CHANDLER, GEORGE ALFRED . .	36, Poultry, E.C.
CLUTTON, JOHN HENRY	9, Whitehall Place, S.W.
CLUTTON, RALPH WILLIAM . .	Hartswood, Reigate.
COOKE, WILLIAM GEORGE	6, Grove Terrace, Hammersmith.
COXWELL, JOHN EDWARD	32, Walbrook, E.C.
CRAWLEY, WILLIAM JEEVES . .	10, Waterloo Place, Pall Mall.

DAVISON, THOMAS JOHN ROBERT. Bedford Office, Montague Street, W.C.

ASSOCIATES.

DEAN, HENRY	Southam, Rugby, Warwickshire.
DODGSON, WILFRED LONGLEY	Burwarton, Bridgnorth.
DOWDEN, HENRY JOSEPH	4, Whitehall, S.W.
EASTON, EDWARD	23, Duke Street, Westminster, S.W.
EDWARDS, JOHN	1, Harcourt Buildings, Temple.
ELWIN, GEORGE HARVEY	{ London and South Western Railway Terminus. Waterloo Road; & 3, Vine Terr., York Rd., S.E.
EVANS, ERNEST WILLIAM	St. Alban's, Herts.
FAWCETT, JAMES POGUE	5, Lancaster Place, W.C.
FOWLER, JOHN	2, Queen Square Place, S.W.
GARRARD, ARTHUR	17, Finsbury Square, E.C.
GEPP, THOMAS MORGAN	Chelmsford.
GOLDNEY, GABRIEL PRIOR	3, Essex Court, Temple, W.C.
GORE, SPENCER W.	16, Whitehall Place, S.W.
GRANTHAM, RICHARD BOXALL	22, Whitehall Place, S.W.
<i>(Associate of Council)</i>	
GRANTHAM, RICHARD FUGE	22, Whitehall Place, S.W.
HOLLWAY JOHN GEORGE	Lamb Building, Temple, W.C.
HOPE, WILLIAM	{ Parsloes, Barking, Essex; and 38, Nicholas Lane, E.C.
HORSLEY, RICHARD	Gresham Buildings, Basinghall Street, E.C.
HUBBERSTY, HENRY ALFRED	Buxton, Derbyshire.
INGRAM, WALTER FEILDE	25, Gresham Street, E.C.
JOHNSON, THOMAS MARR	22, Great George Street, Westminster, S.W.
JOHNSTON, ANDREW	25, Gresham Street, E.C.
JONAS, HENRY	4, Whitehall, S.W.
KEELE, EDWARD RUSHWORTH	5, Frederick's Place, Old Jewry, E.C.
KING, WILLIAM	Gas Office, Duke Street, Liverpool.
LEDGARD, FREDERICK THOMAS } DURELL }	4, Elm Court, Temple, W.C.
LEE, CHARLES WILLIAMS	3, Whitehall Place, S.W.
LERMIT, ALFRED WILLIAM	Dedham, Essex.
LITTLER, RALPH DANIEL MAKIN- SON, Q.C. }	1, Plowden Buildings, Temple, W.C.
LLOYD, JOHN HORATIO	{ 100, Lancaster Gate, W.; and King's Bench Walk, Temple.
<i>(Associate of Council)</i>	
LOTT, JOSEPH	12, Great George Street, S.W.
LOW, ALBERT	3, St. Helen's Place, E.C.
MARRIOTT, WILLIAM THACKERAY	6, Crown Office Row, Temple, W.C.

ASSOCIATES.

NASH, ALFRED JAMES. . . .	Farnham, Surrey.
NIXON, SAMUEL	17, Parliament Street, Westminster, S.W.
PAYNE, WILLIAM SETH ROBERT. . . .	141, Fenchurch Street, E.C.
PETRE, HENRY WILLIAM, THE HON. . . .	Springfield, Chelmsford, Essex.
PHILBRICK, FREDERICK ADOLPHUS, } Q.C.	Lamb Building, Temple.
POWELL, REGINALD HENRY	Lewes, Sussex.
QUICK, JOSEPH, JUN.	{ 29, Great George Street, S.W.; and Sumner Street, Southwark, S.E.
REES, JOHN CHARLES	29, Great George Street, S.W.
REX, WILLIAM	11, Waterloo Place, S.W.
ROBERTS, CHARLES GAY	Haslemere, Surrey.
ROGERS, ARUNDEL	1, Paper Buildings, Temple.
ROGERS, SYDNEY JAMES	7, Westminster Chambers, S.W.
RUSHWORTH, EDMUND WALTER	22, Savile Row, W.
SHIELD, HUGH.	3, Kings Bench Walk, Temple.
SMALLPEICE, GEORGE MOLINEUX	9, Whitehall Place, S.W.
SMITH, CHARLES JOHN	16, Whitehall Place, S.W.
SMITH, HERBERT EDMUND	Darlington, Durham.
SMITH, WILLIAM BINNS	7, New Square, W.C.
SMYTH, EDWARD	{ 9, Whitehall Place; and 8, Mostyn Terrace, North Brixton, S.W.
TATHAM, GEORGE HENRY	27, Southampton Buildings, W.C.
TAYLOR, GEORGE	{ Tithe and Inclosure Commission Office, St. James's Square.
TAYLOR, JOHN.	Earsdon, Northumberland.
THOMPSON, CHARLES WILLIAM	Vacant Lands' Office, Guildhall, E.C.
TOLMÉ, JULIAN HORN.	1, Victoria Street, Westminster, S.W.
TREVELYAN, HARINGTON ASTLEY, } COL.	{ 7, Ormonde Terrace, Regent's Park; and 6, Water- loo Place, S.W.
TROLLOPE, GEORGE FRANCIS	15, Parliament Street, Westminster, S.W.
USILL, GEORGE WILLIAM	3, Great Queen Street, Westminster, S.W.
VENABLES, FREDERICK	Hadley, Barnet.
VULLIAMY, HENRY	17, Moorgate Street, E.C.
WARNER, JOSEPH HENRY	1, Cadogan Place, S.W.
WARNER, WILLIAM HENRY	99, Mount Street, Grosvenor Square, W.
WHITE, FREDERICK MEADOWS	4, Paper Buildings, Temple.
WHITE, THOMAS JENNINGS	8, Whitehall Place, S.W.

ASSOCIATES.—STUDENTS.

WIGRAM, JOHN	South Collingham, Newark, Notts.
WILLIAMS, RICHARD PRICE	9, Great George Street, S.W.
WILSON, WILLIAM	37, Great George Street, S.W.
WING, THOMAS TWINING	17, Woburn Square, W.C.
WOOLLEY, WILLIAM EDWARD	Loughborough, Leicestershire.

Students.

BUSHEY, GEORGE, JUN.	Lewes, Sussex.
CLAYDEN, WALTER	County Chambers, Exeter.
DRIVER, CHARLES WILLIAM	4, Whitehall, S.W.
NEVE, THOMAS	Sissinghurst, Staplehurst, Kent.
RICHARDSON, JOHN JAMES	{ 5, Gladstone Terrace, Bligh Street, Sydney, New South Wales.
THOMSON, JAMES ALFRED	
	The Nurseries, Wimbledon.

Members and Associates are particularly requested to communicate any changes of address to the Secretary, in order to obviate delay in the transmission of the Papers, &c., to which they are entitled.



